

Section 404/NEPA Merger Project Team Meeting  
Concurrence Points 2 and 2A  
October 10, 2018

NC 73 Widening  
From SR 2693 (Davidson-Concord Road) to US 29 (Concord Parkway)  
Mecklenburg and Cabarrus Counties, North Carolina – NCDOT Division 10

STIP Project No. R-5706  
WBS No. 46378.1.1



## Purpose of the Meeting

The purpose of today's meeting is to discuss the preliminary study concepts in the project corridor and determine which concepts should be carried forward for detailed analysis and design (CP2). The results of the preliminary hydraulics analysis will be reviewed to determine bridging and culverting decisions and alignment review (CP2A). Concurrence will be requested for both CP2 and CP2A.

## Project Description

STIP Project R-5706 proposes widening NC 73 (Davidson-Concord Road/Davidson Highway) from SR 2693 (Davidson-Concord Road) to US 29 (Concord Parkway) to four-lanes. The project is comprised of two segments: R-5706A and R-5706B. R-5706A extends from SR 2693 (Davidson-Concord Road) to SR 1394 (Poplar Tent Road) near the Mecklenburg County – Cabarrus County line. R-5706B extends from SR 1394 (Poplar Tent Road) to US 29 in Cabarrus County. The project will include bicycle and pedestrian accommodations. As currently included in the Charlotte Regional Transportation Planning Organization (CRTPO) 2045 Metropolitan Transportation Plan (MTP) and in the Cabarrus-Rowan Metropolitan Planning Organization 2045 MTP, NC 73 is planned to be widened from two to four lanes with a median, wide outside lanes, and sidewalks. The project area is shown on Figure 1 (Vicinity Map), Figure 2 (USGS Map) and Figure 3 (Environmental Features Maps).

## Project Status, Schedule, and Setting

The project is listed in 2018-2027 Final State Transportation Improvement Program (STIP; August 2017) as Project No. R-5706:

- Section A (Davidson-Concord Road to Poplar Tent Road) – Funded
- Section B (Poplar Tent Road to US 29) – Funded

The STIP has allocated \$20,600,000 for right-of-way acquisition, \$2,600,000 for utilities, and \$117,800,000 for construction. \$750,000 has been spent in prior years. Right-of-way acquisition is planned to begin in fiscal year (FY) 2020 and construction is to begin in FY 2022. The project is state-funded and a State Environmental Assessment/Finding of No Significant Impact is being prepared in compliance with North Carolina's State Environmental Policy Act (SEPA).

The following STIP projects are located adjacent to R-5706:

- R-2632AB – proposed widening of NC 73 from NC 115 to SR 2693 (Davidson-Concord Road). Right-of-way and construction are scheduled for 2020 and 2022, respectively.
- U-6029 – proposed widening of SR 1394 (Poplar Tent Road) from Derita Road to NC 73. Right-of-way and construction are scheduled for 2023 and 2025, respectively.
- B-5136 – proposed replacement of Bridge No. 66 and Bridge No. 69 over the Norfolk Southern Railroad. Under construction.

The R-5706 study area encompasses various land uses. Howell Reservoir (also referred to as Coddle Creek Reservoir) is in the middle of the project corridor and is managed by the Water and Sewer Authority of Cabarrus County. West of Howell Reservoir, land use has historically been rural and agricultural. Recently, subdivisions and shopping centers have been developed or are planned to be developed in this area. Land use south of Howell Reservoir is primarily undeveloped or low-density

residential. This land use is expected to remain the same for the foreseeable future. Between Kannapolis Parkway and I-85 land use is primarily commercial with industrial sites and large-scale distribution facilities. The study area between I-85 and US 29 is fully developed with subdivisions and multi-family housing. While commercial sites are scattered throughout this segment, commercial development is primarily concentrated east, near the intersection with US 29.

## Coordination with Local Stakeholders

Local stakeholders have been engaged throughout the planning process. Stakeholders have provided information on local planning efforts and goals, which have informed the proposed typical section, alignment concepts and intersection concepts being analyzed.

The following meetings or presentations have taken place:

- Presentations to the NC 73 Council of Planning in September 2017 and February 2018.
- Meeting with officials from the City of Concord, City of Kannapolis and Cabarrus County in March 2018.
- Meeting with officials from the Town of Huntersville and Town of Davidson in March 2018.
- Meeting with the Water and Sewer Authority of Cabarrus County in March 2018 to discuss Howell Reservoir.

## Concurrence Point 1 – Purpose and Need and Study Area Defined

The Merger Team met and concurred on the project Purpose and Need and Study Area boundary on July 19, 2018.

The purpose of the project is as follows:

- The purpose of the project is to increase mobility between SR 2693 (Davidson-Concord Road) and I-85 and between US 29 (Concord Parkway North) and I-85, reduce congestion at the intersections, improve traffic operations along NC 73 with an operational target of LOS D in the 2040 design year, and provide bicycle and pedestrian facilities.

The study area boundary is shown in Figure 2 and is described as follows:

- The study area extends along NC 73 from Davidson-Concord Road to US 29, generally encompassing an area 250 feet on each side of the existing road centerline. To incorporate potential new location alignments south of Howell Reservoir, the study area expands southward (to a width of as much as one mile) between Village Commons Street Northwest and Biscayne Drive. The study area extends between approximately 1,000 and 2,800 feet along numerous y-lines and has varying widths along the y-lines.

*Note: that the study area boundary was expanded at several intersections and Y-lines after the completion of technical studies. The expanded area was included in the study area boundary approved as part of Concurrence Point 1. natural resources and geoenvironmental studies in the expanded study area are pending. NCDOT has determined that no additional historic or archaeological resources are in the expanded study area.*

## Concepts Recommended for Detailed Study

Due to the proximity of existing resources along the project corridor, a Best Fit alignment was designed and studied for the portion of the project on existing alignment. The concepts differ in how they cross (or do not cross) the Howell Reservoir.

The concepts are described below.

- Concept 1 proposes a Best Fit alignment from Davidson-Concord Road to US 29 with an elevated structure adjacent to the south of the existing causeway over Howell Reservoir.
- Concept 2 proposes a Best Fit alignment from Davidson-Concord Road to US 29 and widening the existing causeway over Howell Reservoir.
- Concept 3 proposes a Best Fit alignment beginning at Davidson-Concord Road with the alignment travelling south of the existing NC 73 centerline beginning approximately 1,700 feet west of the NC 73 and Odell School Road intersection before meeting Odell School Road approximately 1,900 feet south of the NC 73 and Odell School Road intersection. The alignment begins to follow the existing centerlines of Odell School Road, Untz Road and La Forest Lane until approximately 1,000 feet south of the existing NC 73 centerline before extending northeast through existing development and realigning with the existing NC 73 centerline approximately 1,300 feet east of the NC 73 and Riding School Lane intersection and resuming a Best Fit alignment ending at US 29.
- Concept 4 proposes a Best Fit alignment beginning at Davidson-Concord Road with the alignment travelling south of the existing centerline beginning approximately 800 feet east of the NC 73 and Odell School Road intersection and extending between approximately 1,000-2,000 feet south of the existing NC 73 centerline before realigning with the existing NC 73 centerline at the intersection of NC 73 and La Forest Lane and resuming a Best Fit alignment ending at US 29.

A No Build concept would maintain existing facilities. Impacts to the natural environment and human environment would not occur; however, a no build concept does not address the purpose and need for the project.

All concepts exclude improvements around the I-85 interchange at NC 73. The interchange was previously converted to a Diverging Diamond Interchange as part of the I-85 widening, and was completed in 2014. The R-5706 design would primarily tie to this previously constructed project.

Numerous design options are being considered at the signalized intersections along the corridor. In addition to a No Build alternative, the following intersection design options are being considered.

- Poplar Tent Road – Design options being considered include Superstreet, Continuous Flow Intersection (CFI), and Quadrant Intersection
- Odell School Road – Design options being considered include Superstreet and CFI
- Kannapolis Parkway – Design options being considered include Grade Separation with a Quadrant
- International Drive NW – Design options being considered include Superstreet, Quadrant, and Bowties
- Winecoff School Road – Design options being considered include Superstreet and CFI
- Central Drive NW – Design options being considered include Superstreet, CFI, and Bowties

## Typical Sections

The project proposes unique typical sections for three sections of the project. Each features four lanes of travel, a median, curb and gutter, and bicycle and pedestrian facilities. The extent of the three sections are as follows:

- Davidson-Concord Road to Poplar Tent Road – includes multi-use path on both sides of the road, 12-foot lanes, 30-foot raised median, and 50 mph design speed.
- Poplar Tent Road to I-85 – includes sidewalks and 4-foot bike lanes on both sides of the road, 12-foot lanes, 30-foot raised median, and 50 mph design speed.
- I-85 to US 29 – includes sidewalks and 5-foot bike lanes on both sides of the road, 11-foot lanes, 23-foot raised median, and 40-50 mph design speed.

Typical sections are illustrated in Attachment 1 below.

## Avoidance and Minimization

Measures to avoid and minimize impacts to jurisdictional waters of the U.S. were incorporated into the best fit design of each Concept east and west of the reservoir. The presence of public parks, conservation easements, historic properties, cemeteries, churches, and residential and commercial buildings were taken into consideration when developing the best fit concepts.

Concepts 3 and 4 were designed to avoid impacts to Howell Reservoir. The alignments for Concepts 3 and 4 were also designed to minimize wetland and stream impacts south of the reservoir, giving consideration to the presence of residences. In addition, Concept 3 was designed to avoid impacts to Odell Elementary School west of the reservoir.

## Potential Impacts

### Parks, Recreation Facilities, and Conservation Easements

Two active parks and recreation areas are in the study area. Bradford Park (owned by Mecklenburg County) is located on the western end of the project between Ramah Church Road and McAuley Road on the south side of NC 73. Red Ventures Soccer Park, owned by the Charlotte Soccer Academy, is located on the eastern end of the project between Stockton Avenue and Fairington Drive north of NC 73. White Community Park, located north of the NC 73 and McAuley Road intersection, is an undeveloped park owned by Mecklenburg County. Mecklenburg County Parks and Recreation confirmed there are no development plans for the Park in the next five years. Multiple conservation easements are located west of Howell Reservoir. Easements deeded to the Catawba Land Conservancy are adjacent to Bradford Park. An easement deeded to the Cabarrus Soil and Water Conservation District and Catawba Lands Conservancy Easement is located just west of Wellington Chase Drive. The analysis of parks, recreation facilities, and conservation easements includes the expanded study area.

### Major Utility Crossings

There are major utilities in the corridor. A preliminary utility report will be prepared.

## Geoenvironmental

A Phase 1 analysis was completed in March 2018 by NCDOT's GeoEnvironmental Section. Thirty-nine sites of concern were identified in the study area; all are anticipated to have a low financial and scheduling impact. A review of the expanded study area will be conducted by NCDOT.

## Archaeological Resources

Archaeology analysis was completed in April 2018. No eligible sites were identified. A review of the expanded study area was completed in September 2018 and it was determined that no archaeological survey was required.

## Historic Resources

The Historic Structures Report was completed in April 2018. The report identified eight properties that were previously evaluated in the study area, two of which were previously determined Eligible. The Eligible properties are the Bradford House and Farm and the Jesse and Mary K. Washam Farm. These two properties are also listed as Local Landmarks. An additional Local Landmark, Cashion & Moore Family Cemetery, was previously determined Not Eligible. The report indicates that the eight resources were recently evaluated in other reports and that DOT historians determined that the eligibility of the eight resources remains valid. Three additional resources were surveyed for R-5706 and were recommended ineligible. Information regarding historic properties is included in Table 1.

In September 2018 NCDOT determined that no new properties over 50 years of age would warrant further evaluation in the expanded study area.

*Table 1 – Historic Properties*

Property Name	NC-HPO Survey Site No.	Eligibility Determination	Criteria	Notes
<b>Previously Evaluated Properties Within the R-5706 Project Study Area</b>				
Southern Railway Overpass Bridge	CA1086	Not Eligible	N/A	Surveyed 1981
Bradford House/Farm	MK1283	Eligible	B, C	Determined Eligible 2011
Tib Morehouse Tenant House	MK2277	Not Eligible	N/A	Determined Not Eligible 2011
Caldwell Tenant House	MK2279	Not Eligible	N/A	Surveyed 1987-1988
Columbus Chapel AME Zion Church	MK2281	Not Eligible	N/A	Surveyed 1987-1988
Marcus and Nancy Caldwell House	MK2444	Not Eligible	N/A	Determined Not Eligible 2007
William and Kate Mayes House	MK2448	Not Eligible	N/A	Determined Not Eligible 2007
Jesse and Mary K. Washam Farm	MK2455	Eligible	C	Determined Eligible 2011
<b>Properties Surveyed as party of R-5706</b>				
Blackwelder-Litaker House	CA0309	Not Eligible	N/A	N/A
Cashion & Moore Family Cemetery	MK2916	Not Eligible	N/A	N/A
Braford Store	MK2811	Not Eligible	N/A	N/A

## Natural Resources

The Natural Resource Technical Report for the project was completed in August 2017. An addendum to the NRTR will be prepared to include a delineation of jurisdictional resources and an assessment of threatened and endangered species in the expanded study area. Potential stream resources in the expanded study area have been identified through GIS data. These potential stream impacts are included in the impact tables for the intersection options.

## Environmental Justice

Based on Census data, minority and low-income populations meeting the criteria for Environmental Justice are in the eastern end of the study area between I-85 and US 29. Manufactured homes and a Spanish-language grocery store are in the impact area. A manufactured home community is also located just west of Poplar Tent Road in Mecklenburg County in the impact area. The analysis of minority and low-income populations includes the expanded study area. A Relocation Report has not yet been prepared for the project; impacts to Environmental Justice communicates cannot be fully assessed at this time.

## Impact Tables

The impact areas for the concepts have been calculated using an impact area of slope stake limits plus 40 feet (see Table 2). The impact areas for the intersection options have been calculated using an impact area of proposed back of curb plus 50 feet (See Tables 3 through 8). Level of service tables can be found in Appendix A.

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Table 2 - Potential Concept Impacts (Slope Stakes + 40')

	Concept 1	Concept 2	Concept 3	Concept 4
Schools	3	3	3	3
Recreation Areas and Parks	3	3	3	3
Existing and Proposed Greenway Crossings	3	3	3	3
Places of Worship	3	3	3	3
Cemeteries	1	1	1	1
Major Utility Crossings	Yes	Yes	Yes	Yes
Historic Properties (eligible for listing)	2	2	2	2
Local Landmarks	3	3	3	3
Archaeological Sites	0	0	0	0
Federal Listed Species within the Corridor <sup>1</sup>	Yes	Yes	Yes	Yes
State Listed Species	No	No	No	No
100 Year Floodplain and Floodway Crossings	7	7	6	6
U.S Forest Service Impacts	n/a	n/a	n/a	n/a
Prime Farmland Soil Impacts (acres)	185.5	186.1	210.8	184.3
State Wide Importance Soil Impacts (acres)	58.5	59.7	62.7	77.5
Estimated Residential Structures Impacted	80-90	80-90	90-100	80-90
Estimated Business Structures Impacted	10-20	10-20	10-20	10-20
Haz Mat Sites	17	17	17	17
Delineated Wetland Impacts (acres)	0.6	0.6	0.7	0.6
Delineated Wetland Impacts (crossings)	9	9	10	11
Delineated Stream Impacts (LF)	2,824.8	2,824.8	3,036.4	3,424.3
Delineated Stream Impacts (Crossings)	12	12	14	16
Delineated Open Water (acres)	2.3	5.6	0.1	0.2
State Riparian Buffer Impacts (acres) <sup>2</sup>	n/a	n/a	n/a	n/a
Water Supply Watersheds (acres)	33.1	36.7	9.0	47.6
Wildlife Refuges and Gamelands	n/a	n/a	n/a	n/a
Estimated Noise Receptors	410-420	410-420	470-480	410-420
Federal Lands	n/a	n/a	n/a	n/a
Potential Low Income Population Impacts	Yes	Yes	Yes	Yes
Potential Minority Population Impacts	Yes	Yes	Yes	Yes
Potential Natural Heritage Natural Areas (acres)	0	0	0	0
Conservation Easements	2	2	2	2

<sup>1</sup> NLEB only, project complies with 4(d) rule

<sup>2</sup> Local buffer rules may apply

Table 3 - Poplar Tent Road Intersection Options – Potential Impacts (Back of Curb + 50')

	Superstreet	Quad	CFI
Schools	1	0	1
Recreation Areas and Parks	0	0	0
Existing and Proposed Greenway Crossings	0	0	0
Places of Worship	1	1	1
Cemeteries	0	0	0
Major Utility Crossings	No	No	No
Historic Properties	0	0	0
Local Landmarks	0	0	0
Archaeological Sites	0	0	0
Federal Listed Species within the Corridor <sup>3</sup>	Yes	Yes	Yes
State Listed Species	No	No	No
100 Year Floodplain and Floodway Crossings	0	0	0
U.S Forest Service Impacts	n/a	n/a	n/a
Prime Farmland Soil Impacts (acres)	14.9	20.7	17.7
State Wide Importance Soil Impacts (acres)	1.3	0.3	2.5
Estimated Residential Relocations	1	3	10
Estimated Business Relocations	0	0	2-3
Haz Mat Sites	1	1	1
Delineated Wetland Impacts (acres)	0.03	0.03	0.03
Delineated Wetland Impacts (crossings)	2	2	2
Delineated Stream Impacts (LF)	0	0	0
Delineated Stream Impacts (Crossings)	0	0	0
<i>Potential Stream Impacts (LF)<sup>4</sup></i>	0	0	0
<i>Potential Stream Impacts (Crossings)<sup>5</sup></i>	0	0	0
Delineated Open Water (acres)	0	0	0
State Riparian Buffer Impacts (acres) <sup>6</sup>	n/a	n/a	n/a
Water Supply Watersheds (acres)	0	0	0
Wildlife Refuges and Gamelands	n/a	n/a	n/a
Estimated Noise Receptors	50-60	30-40	50-60
Federal Lands	n/a	n/a	n/a
Low Income Population Impacts	No	No	N
Potential Minority Population Impacts	No	No	No
Potential Natural Heritage Natural Areas (acres)	0	0	0
Conservation Easements	0	0	0

<sup>3</sup> NLEB only, project complies with 4(d) rule

<sup>4</sup> Estimate from GIS analysis

<sup>5</sup> Estimate from GIS analysis

<sup>6</sup> Local buffer rules may apply

Table 4 - Odell School Road Intersection Options – Potential Impacts (Back of Curb + 50')

	Superstreet	CFI
Schools	1	1
Recreation Areas and Parks	0	0
Existing and Proposed Greenway Crossings	0	0
Places of Worship	0	0
Cemeteries	0	0
Major Utility Crossings	No	No
Historic Properties	0	0
Local Landmarks	0	0
Archaeological Sites	0	0
Federal Listed Species within the Corridor <sup>7</sup>	Yes	Yes
State Listed Species	No	No
100 Year Floodplain and Floodway Crossings	0	0
U.S Forest Service Impacts	n/a	n/a
Prime Farmland Soil Impacts (acres)	15.9	19.3
State Wide Importance Soil Impacts (acres)	1.4	1.2
Estimated Residential Relocations	1	2
Estimated Business Relocations	1	1
Haz Mat Sites	2	2
Delineated Wetland Impacts (acres)	0	0
Delineated Wetland Impacts (crossings)	0	0
Delineated Stream Impacts (LF)	0	0
Delineated Stream Impacts (Crossings)	0	0
<i>Potential Stream Impacts (LF)<sup>8</sup></i>	0	0
<i>Potential Stream Impacts (Crossings)<sup>9</sup></i>	0	0
Delineated Open Water (acres)	0	0
State Riparian Buffer Impacts (acres) <sup>10</sup>	n/a	n/a
Water Supply Watersheds Impacts (acres)	7.9	7.72
Wildlife Refuges and Gamelands	n/a	n/a
Estimated Noise Receptors	20-30	20-30
Federal Lands	n/a	n/a
Potential Low Income Population Impacts	No	No
Potential Minority Population Impacts	No	No
Natural Heritage Natural Areas (acres)	0	0
Conservation Easements	0	0

<sup>7</sup> NLEB only, project complies with 4(d) rule

<sup>8</sup> Estimate from GIS analysis

<sup>9</sup> Estimate from GIS analysis

<sup>10</sup> Local buffer rules may apply

Table 5 - Kannapolis Parkway Intersection Options – Potential Impacts (back of Curb + 50')

	Grade Separation	CFI (does not meet P&N)
Schools	0	0
Recreation Areas and Parks	0	0
Existing and Proposed Greenway Crossings	0	0
Places of Worship	1	1
Cemeteries	0	0
Major Utility Crossings	No	No
Historic Properties	0	0
Local Landmarks	0	0
Archaeological Sites	0	0
Federal Listed Species within the Corridor <sup>11</sup>	Yes	Yes
State Listed Species	No	No
100 Year Floodplain and Floodway Crossings	0	0
U.S. Forest Service Impacts	n/a	n/a
Prime Farmland Soil Impacts (acres)	20.1	17.8
State Wide Importance Soil Impacts (acres)	6.0	5.8
Estimated Residential Relocations	6	2
Estimated Business Relocations	0	1
Haz Mat Sites	2	2
Delineated Wetland Impacts (acres)	<.001	0
Delineated Wetland Impacts (crossings)	1	0
Delineated Stream Impacts (LF)	0	36
Delineated Stream Impacts (Crossings)	0	1
<i>Potential Stream Impacts (LF)</i> <sup>12</sup>	0	105
Potential Stream Impacts (Crossings) <sup>13</sup>	0	2
Delineated Open Water (acres)	0	0
State Riparian Buffer Impacts (acres) <sup>14</sup>	n/a	n/a
Water Supply Watersheds Impacts (acres)	0	0
Wildlife Refuges and Gamelands	n/a	n/a
Estimated Noise Receptors	20-30	10-20
Federal Lands	n/a	n/a
Potential Low Income Population Impacts	No	NO
Potential Minority Population Impacts	No	No
Natural Heritage Natural Areas (acres)	0	0
Conservation Easements	0	0

<sup>11</sup> NLEB only, project complies with 4(d) rule

<sup>12</sup> Estimates from GIS analysis

<sup>13</sup> Estimates from GIS analysis

<sup>14</sup> Local buffer rules may apply

Table 6 - International Drive NW Intersection Options – Potential Impacts (Back of Curb + 50')

	Superstreet	Quad	Bow Tie
Schools	0	0	0
Recreation Areas and Parks	0	0	0
Existing and Proposed Greenway Crossings	0	0	0
Places of Worship	0	0	0
Cemeteries	0	0	0
Major Utility Crossings	No	No	No
Historic Properties	0	0	0
Local Landmarks	0	0	0
Archaeological Sites	0	0	0
Federal Listed Species within the Corridor <sup>15</sup>	Yes	Yes	Yes
State Listed Species	No	No	No
100 Year Floodplain and Floodway Crossings	0	0	0
U.S. Forest Service Impacts	n/a	n/a	n/a
Prime Farmland Soil Impacts (acres)	13.8	16.5	3.1
State Wide Importance Soil Impacts (acres)	3.4	4.5	22.1
Estimated Residential Relocations	2-10	6	2-10
Estimated Business Relocations	2	2	2
Haz Mat Sites	5	5	5
Delineated Wetland Impacts (acres)	0	0	0
Delineated Wetland Impacts (crossings)	0	0	0
Delineated Stream Impacts (LF)	0	0	0
Delineated Stream Impacts (Crossings)	0	0	0
<i>Potential Stream Impacts (LF)<sup>16</sup></i>	<i>143</i>	<i>143</i>	<i>480</i>
<i>Potential Stream Impacts (Crossings)<sup>17</sup></i>	<i>1</i>	<i>1</i>	<i>1</i>
Delineated Open Water (acres)	0	0	0
State Riparian Buffer Impacts (acres) <sup>18</sup>	n/a	n/a	n/a
Water Supply Watersheds Impacts (acres)	0	0	0
Wildlife Refuges and Gamelands	n/a	n/a	n/a
Estimated Noise Receptors	30-40	40-50	40-50
Federal Lands	n/a	n/a	n/a
Potential Low Income Population Impacts	No	No	No
Potential Minority Population Impacts	No	No	No
Natural Heritage Natural Areas (acres)	0	0	0
Conservation Easements	0	0	0

<sup>15</sup> NLEB only, project complies with 4(d) rule

<sup>16</sup> Estimate from GIS analysis

<sup>17</sup> Estimate from GIS analysis

<sup>18</sup> Local buffer rules may apply

Table 7 - Winecoff School Road Intersection Options – Potential Impacts (Back of Curb + 50')

	Traditional	Superstreet	CFI
Schools	0	0	0
Recreation Areas and Parks	0	0	0
Existing and Proposed Greenway Crossings	0	0	0
Places of Worship	0	0	0
Cemeteries	0	0	0
Major Utility Crossings	No	No	No
Historic Properties	0	0	0
Local Landmarks	0	0	0
Archaeological Sites	0	0	0
Federal Listed Species within the Corridor <sup>19</sup>	Yes	Yes	Yes
State Listed Species	No	No	No
100 Year Floodplain and Floodway Crossings	0	0	0
U.S. Forest Service Impacts	n/a	n/a	n/a
Prime Farmland Soil Impacts (acres)	9.8	10.2	9.6
State Wide Importance Soil Impacts (acres)	0.02	0.02	0.04
Estimated Residential Relocations	11-20	21-30	11-20
Estimated Business Relocations	0	0	0
Haz Mat Sites	0	0	0
Delineated Wetland Impacts (acres)	0	0	0
Delineated Wetland Impacts (crossings)	0	0	0
Delineated Stream Impacts (LF)	0	0	0
Delineated Stream Impacts (Crossings)	0	0	0
<i>Potential Stream Impacts (LF)<sup>20</sup></i>	0	0	0
<i>Potential Stream Impacts (Crossings)<sup>21</sup></i>	0	0	0
Delineated Open Water (acres)	0	0	0
State Riparian Buffer Impacts (acres) <sup>22</sup>	n/a	n/a	n/a
Water Supply Watersheds Impacts (acres)	0	0	0
Wildlife Refuges and Gamelands	n/a	n/a	n/a
Estimated Noise Receptors	80-90	80-90	70-80
Federal Lands	n/a	n/a	n/a
Potential Low Income Population Impacts	Yes	Yes	Yes
Potential Minority Population Impacts	Yes	Yes	Yes
Natural Heritage Natural Areas (acres)	0	0	0
Conservation Easements	0	0	0

<sup>19</sup> NLEB only, project complies with 4(d) rule

<sup>20</sup> Estimate from GIS analysis

<sup>21</sup> Estimate from GIS analysis

<sup>22</sup> Local buffer rules may apply

Table 8 - Central Drive NW Intersection Options – Potential Impacts (Back of Curb + 50')

	Superstreet	CFI	Bow Tie
Schools	0	0	0
Recreation Areas and Parks	0	0	0
Existing and Proposed Greenway Crossings	0	0	0
Places of Worship	0	0	0
Cemeteries	0	0	0
Major Utility Crossings	Yes	No	No
Historic Properties	0	0	0
Local Landmarks	0	0	0
Archaeological Sites	0	0	0
Federal Listed Species within the Corridor <sup>23</sup>	Yes	Yes	Yes
State Listed Species	No	No	No
100 Year Floodplain and Floodway Crossings	1	0	0
U.S. Forest Service Impacts	n/a	n/a	n/a
Prime Farmland Soil Impacts (acres)	11.96	12.52	13.39
State Wide Importance Soil Impacts (acres)	0	0	0
Estimated Residential Relocations	1-10	11-20	11-20
Estimated Business Relocations	1-10	11-20	11-20
Haz Mat Sites	5	5	5
Delineated Wetland Impacts (acres)	0	0	0
Delineated Wetland Impacts (crossings)	0	0	0
Delineated Stream Impacts (LF)	244.82	0	0
Delineated Stream Impacts (Crossings)	1	0	0
<i>Potential Stream Impacts (LF)<sup>24</sup></i>	0	0	0
<i>Potential Stream Impacts (Crossings)<sup>25</sup></i>	0	0	0
Delineated Open Water (acres)	0	0	0
State Riparian Buffer Impacts (acres) <sup>26</sup>	n/a	n/a	n/a
Water Supply Watersheds Impacts (acres)	0	0	0
Wildlife Refuges and Gamelands	n/a	n/a	n/a
Estimated Noise Receptors	50-60	70-80	80-90
Federal Lands	n/a	n/a	n/a
Potential Low Income Population Impacts	Yes	Yes	Yes
Potential Minority Population Impacts	Yes	Yes	Yes
Natural Heritage Natural Areas (acres)	0	0	0
Conservation Easements	0	0	0

<sup>23</sup> NLEB only, project complies with 4(d) rule

<sup>24</sup> Estimate from GIS analysis

<sup>25</sup> Estimate from GIS analysis

<sup>26</sup> Local buffer rules may apply

## Alignment Review and Bridging and Culverting Decisions (CP2A)

### Preliminary Hydraulic Study for Environmental Impacts

The Preliminary Hydraulic Technical Report for R-5706 was completed in November 2017. The report included a hydrologic and hydraulic analysis and field visit in order to identify major stream crossings. Seven major stream crossings were identified in the report and structure recommendations were made for these existing stream crossing locations (see Table 9).

Subsequent to the preparation of the Preliminary Hydraulic Technical Report a hydrologic and hydraulic analysis of the new alignment segments of Concepts 3 and 4 south of the existing NC 73 was conducted. A total of five potential stream crossing locations were analyzed in these new alignment segments. The analysis indicated that four of the potential crossings would not be considered major crossings (i.e., would not require a culvert greater than 72" in diameter). The fifth crossing would be considered a major crossing, namely the crossing of Coddle Creek in Concept 3. Based on the proximity of the Concept 3 crossing of Coddle Creek to the existing crossing on NC 73, the recommendation at this location matches the recommendation made in the Preliminary Hydraulic Technical Report of a 3 Span, 210 ft. bridge. A site visit to the stream crossing locations along the new alignment segments of Concepts 3 and 4 was not conducted as part of this analysis.

Information on each stream crossing requiring major structures is discussed below.

#### Site 1 (Rocky River) *FEMA Detailed Study*

This stream crossing has a drainage area of 40.8 square miles. The current land use is primarily residential and wooded. There is evidence of new construction/development within the watershed. The existing structure is a four (4) span bridge, 181 feet long, with a skew angle of 90 degrees per a bridge report date February 6<sup>th</sup>, 2017. The superstructure is comprised of a reinforced concrete deck on precast, prestressed, concrete girders. End bents and interior bents are reinforced concrete caps on precast prestressed concrete piles. The normal depth of flow is 0.6 feet deep. The nearest structure upstream of the crossing with NC-73 is a three (3) span bridge along SR 1600. The nearest downstream structure is another 3-span bridge. This downstream bridge carrier SR 1449 and is 117 feet long.

#### Site 2 (UT to Rocky River) *FEMA Limited Detail Study*

This stream crossing has a drainage area of 1.26 square miles. The current land use is Residential/forested and is likely to experience development in the future. The existing structure is double barrel corrugated metal pipe (CMP), 1 @ 9' and 1 @ 5.5'. Neither barrel is buried. The CMPs have one continuous stone headwall on both ends and are approximately 4' apart. The 9' diameter barrel has corrosion which has created holes in the pipe. The normal depth of flow is 0.1 to 0.4 feet deep. The banks upstream were stable. Preliminary calculations suggest that the 100-year storm does not overtop the road. The nearest structures to the culvert are detached homes, and are approximately 430 feet away. Downstream of the crossing at NC-73, nearer to the confluence with Rocky River there are residential structures within the preliminary mapped 100-year floodplain.

Table 9 - Existing Hydraulic Structures and Recommendations

Site Number	Stream ID	Stream Name	Stream Class	FEMA Study Type	Drainage Area (mi <sup>2</sup> )	Existing Structure	Proposed Structure
1	RR	Rocky River	C, 303d (Benthos)	Detailed	40.8	4 Span, 181' OAL	3 span bridge, 200' OAL
2	SBA	UT to Rocky River	C	Limited	1.26	Double Barrel CMPs	2@ 8' x 8' RCBC
3	CC	Coddle Creek	C, 303d (Benthos)	Detailed	47.8	4 Span, 181 OAL	3 Span, 210' OAL*
4	AR	Afton Run	C	Detailed	3.93	2@ 9' x 9' RCBC	2@ 14' x 9' RCBC
5	IB	Irish Buffalo Creek	C, 303d (Copper)	Detailed	26.6	3 Span, 160' OAL	3 Span, 185 OAL
6	SCF	UT to Irish Buffalo Creek	C	none	0.50	1@ 9' x 8' RCBC	1@ 10' x 8' RCBC
7	SCH	Stricker Branch	C	Detailed	0.52	2@ 5' x 5' RCBC	2@ 8' x 5' RCBC

\*This recommendation corresponds to Concepts 1, 2, and 4. Concept 3 crosses Coddle Creek further south than the existing crossing. Based on a desktop review of existing conditions, a 3 Span, 210' bridge is recommended but further analysis is required.

#### Site 3 (Coddle Creek) FEMA Detailed Study

This stream crossing has a drainage area of 47.8 square miles. The current land use is mostly rural, with scattered residential development. The existing structure is a 4-span bridge, 181 feet long, with a skew angle of 60 degrees per a bridge inspection report dated February 11, 2015. The superstructure is a reinforced concrete deck on precast, prestressed concrete girders. End bents and interior bents are reinforced concrete caps on precast prestressed concrete piles. The upstream and downstream banks appear stable. The normal depth of flow is three feet. Upstream of the structure is a dam for the Lake Howell reservoir/impoundment. The dam includes both an auxiliary spillway and an emergency spillway and could significantly affect the downstream discharge and flood elevation, especially during larger storm events. The nearest NCDOT structure upstream of the crossing is a 4-span cored slab bridge with an overall length of 163 feet.

#### Site 4 (Afton Run) FEMA Detailed Study

This stream crossing has a drainage area of 3.93 square miles. The current land use is mostly forested/rural, with scattered impervious areas including residential, industrial, and recreational. The existing structure is a reinforced concrete box culvert (RCBC), 2 @ 9 feet x 9 feet, under NC-73 at Afton Run. One barrel is buried approximately 1' and the other barrel is buried approximately 1.5'. The top slab is approximately 1.9' thick and is covered by approximately 1' of fill. The dual RCBC has wingwalls on both ends. The existing RCBC is perpendicular to the existing road alignment. Upstream of the culvert, there are some isolated areas of bank erosion. Immediately downstream of the existing culvert

the banks are stable. The normal depth of flow is 1.5 to 2.5 feet deep. Preliminary calculations suggest that the 100-year storm does not overtop the road. The structure upstream of the crossing at NC-73 is another bridge along SR-1430. The bridge is 2 spans, of concrete girder, with an overall length of 154.5 feet. The downstream structure is a quad RCBC (C-382) under I-85. The culvert configuration is as follows: 2 @ 7 feet x 8 feet and 2 @ 9 feet x 8 feet, with a length of 271 feet.

#### Site 5 (Irish Buffalo Creek) *FEMA Detailed Study*

This stream crossing has a drainage area of 26.6 square miles. The current land use is primarily residential and forested with small areas of industrial/commercial usage. The existing structure is 3 span bridge, 150 feet long with a skew angle of 60 degrees per a bridge inspection report dated May 25<sup>th</sup>, 2015. The superstructure is comprised of a reinforced concrete deck on precast, prestressed, concrete girders. End bents and interior bents are reinforced concrete caps on precast prestressed concrete piles. The normal depth of flow is approximately 1.0 feet. The structure upstream of the crossing at NC-73 measures 175.4 feet and consists of two (2) spans. The upstream structure is currently undergoing a replacement, as part of the construction along the I-85 corridor. The nearest downstream structure is a 3-span bridge with an overall length of 173 feet. The structure is at the crossing of Irish Buffalo Creek and US-29.

#### Site 6 (UT to Irish Buffalo Creek) *No FEMA Study*

This stream crossing has a drainage area of 0.50 square miles. The current land use is moderately developed, consisting of residential, industrial, and agricultural land uses. The existing structure is a RCBC, 9 feet x 8 feet. The RCBC is buried 1 foot. The top slab is 2 feet thick and is covered by approximately 1 foot of fill. The RCBC has concrete wingwalls on either side. The existing RCBC is perpendicular to the existing road alignment. Immediately upstream of the culvert the banks are stable. Downstream of the culvert the banks are eroded. It appeared that riprap was placed on the slopes to help stabilize the slopes but the side slopes have failed and the riprap was in the stream. The normal depth of flow is approximately 1.2 feet deep. Preliminary calculations suggest that the 100-year storm does not overtop the road.

#### Site 7 (Stricker Branch) *FEMA Detailed Study*

This stream crossing has a drainage area of 0.52 square miles. The current land use is developed, including a mix of residential, commercial, and industrial areas. The existing structure is a RCBC, 2 @ 5 feet x 5 feet, under NC-73 at Stricker Branch. One barrel is buried approximately 1 foot and the other barrel is buried approximately 2.5 feet. The top slab is approximately 1.5 feet thick and is covered by approximately 1 foot of fill. The dual RCBC has wingwalls on both ends. The existing RCBC is perpendicular to the existing road alignment. Immediately upstream of the culvert the banks are stable. The downstream banks were eroded, and nearly vertical in places. Downstream of the culvert, riprap was prevalent within the stream channel and there was a concrete flume that conveyed flow to the stream which was broken with the area surrounding it eroded. The nearest structures along Stricker Branch include a 3.5 feet diameter CMP culvert upstream of NC-73 and a dual RCBC (2 @ 6 feet x 5 feet) downstream of NC-73. Near the downstream wingwalls, a 24 inch RCP stormwater pipe discharges into the creek. The area around the pipe and the wingwall (left side of the channel, looking upstream) are eroded. The normal depth of flow is approximately 0.3 to 0.8 feet deep.

## Water Resources (from the NRTR)

Water resources in the study area are part of the Yadkin Pee Dee River basin [U.S. Geological Survey (USGS) Hydrologic Unit 03040105]. The location of each water resource identified in the project study area is shown in Figure 3.

Fifty-five streams were identified in the study area. The characteristics of these streams are provided in Tables B1 – B4 in Appendix B.

Seventy-five jurisdictional wetlands were identified within the study area. Wetland classification and quality rating data are presented in Table B5 in Appendix B.

Twelve open waters were delineated in the study area, including Howell Reservoir. The open waters are summarized in Table B6 in Appendix B.

There are no designated anadromous fish waters or Primary Nursery Areas (PNA) in the study area. There are no designated Outstanding Water Resources (OWR) within 1.0 mile downstream of the study area. Coddle Creek is listed as a High Quality Water (HQW) and water supply watershed (WS-II) within the study area. No other HQW, WS-I, or WS-II are located within or 1.0 mile downstream of the study area. The North Carolina Wildlife Resources Commission (NCWRC) has identified no waters as trout waters within 1.0 mile of the study area. Coddle Creek (Stream Index #13-17-6-(5.5) is within the study area and one mile downstream of the study area, and is included in the North Carolina 2016 Draft 303 (d) lists of impaired waters as the result of benthic analysis.

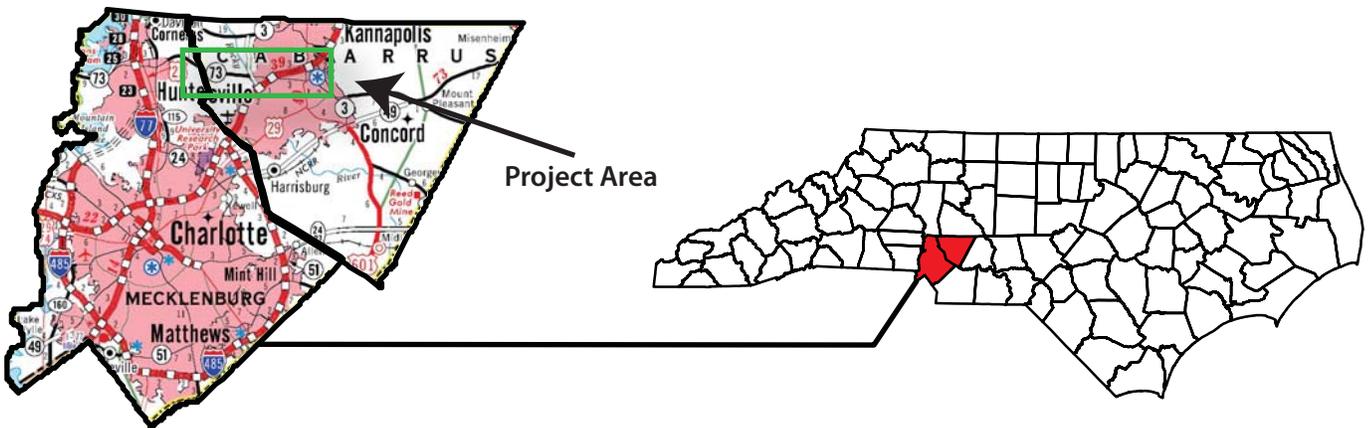
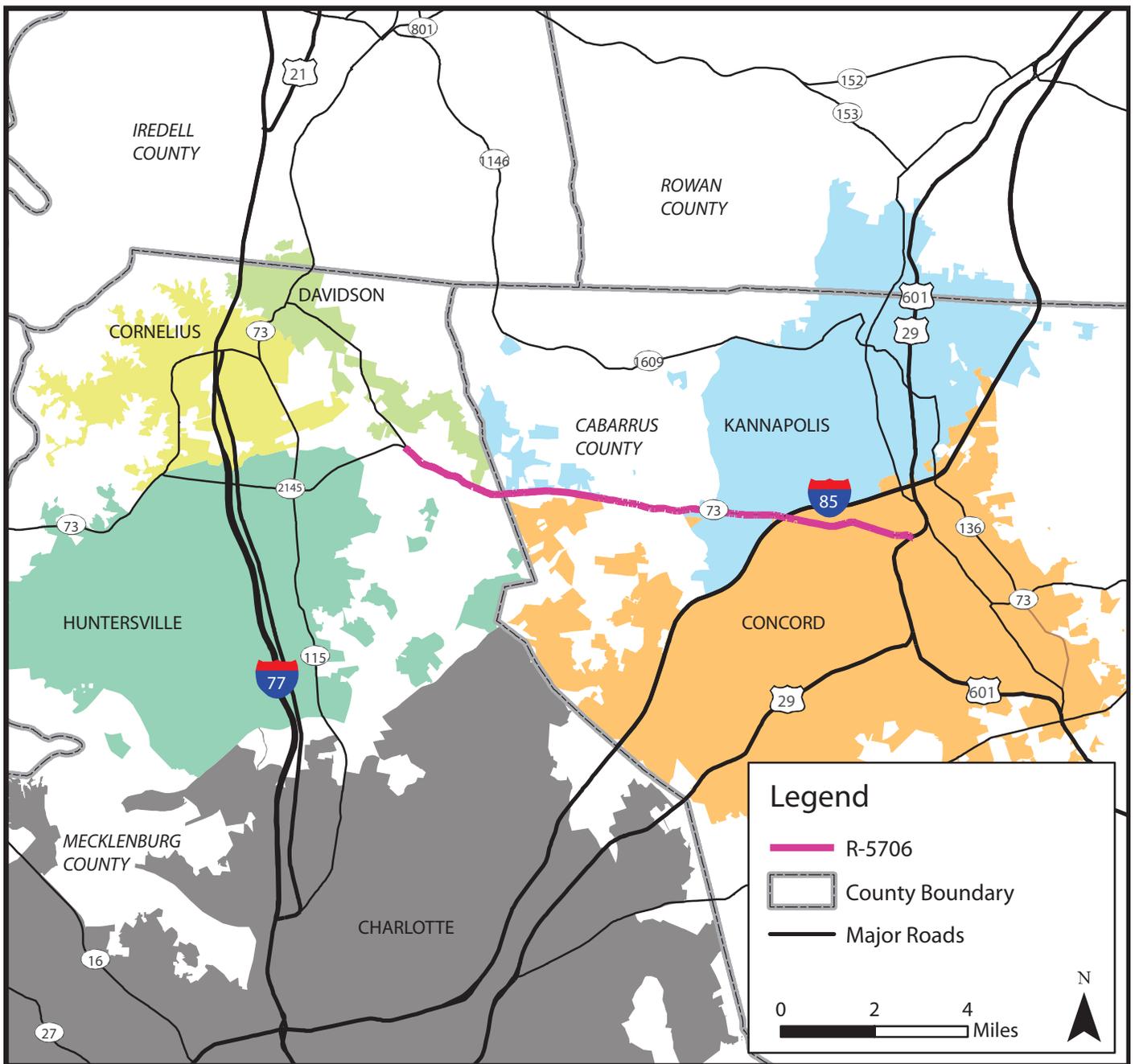
There are no benthic monitoring sites within 1.0 mile downstream of the study area. There are no sites monitored by the NC Stream Fish Community Assessment Program or the NCDWR Ambient Monitoring System within 1.0 mile downstream of the study area.

## List of Figures

1. Project Vicinity Map
2. Project Study Area Map
3. Environmental Features Map

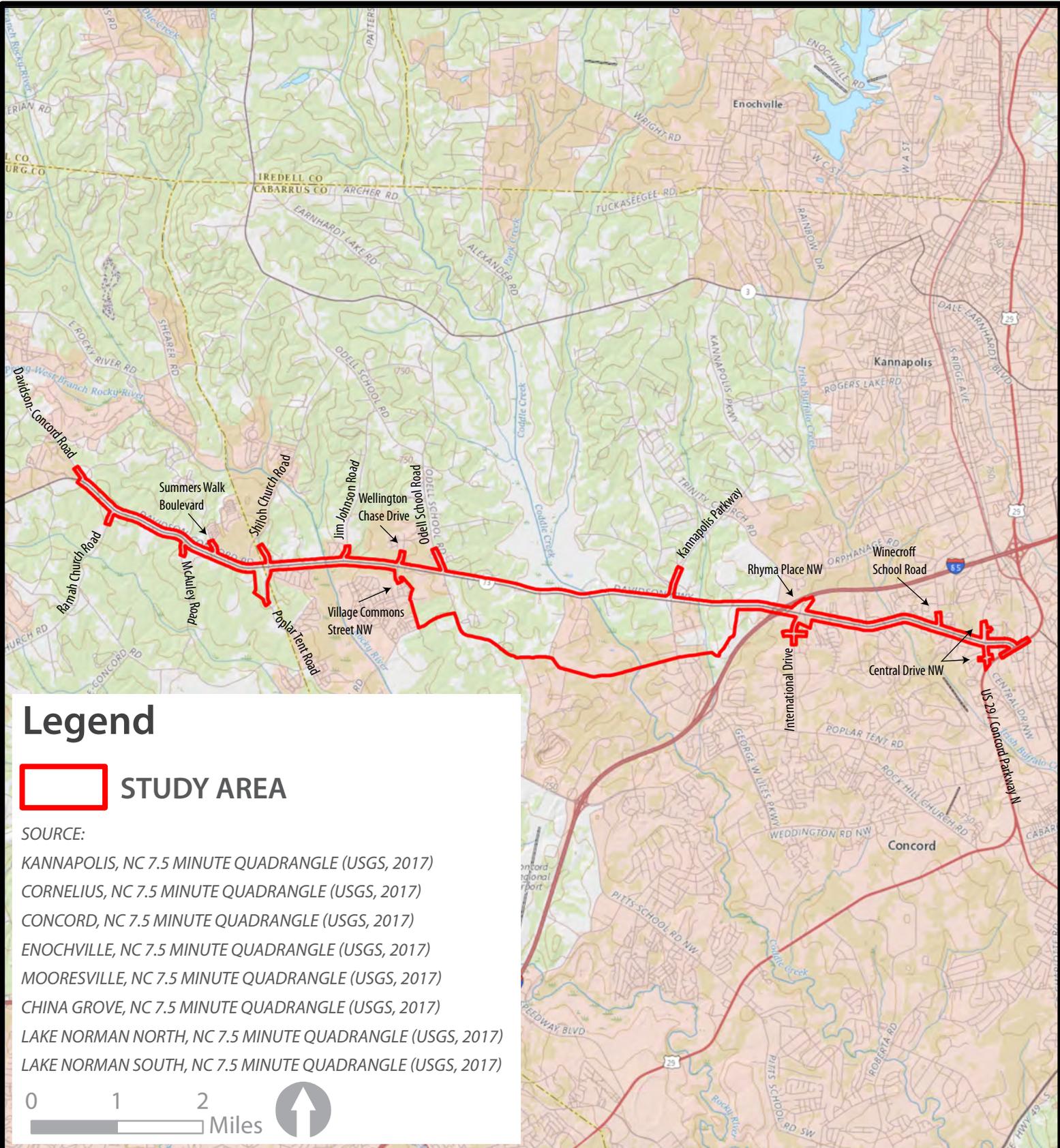
## Appendices

- A. Traffic Information
- B. Jurisdictional Features Tables
- C. Typical Sections



**Project Vicinity Map**  
 Widening of NC 73 from Davidson - Concord Road to US 29,  
 Mecklenburg and Cabarrus Counties  
 STIP PROJECT R-5706

**Figure 1**



# Legend

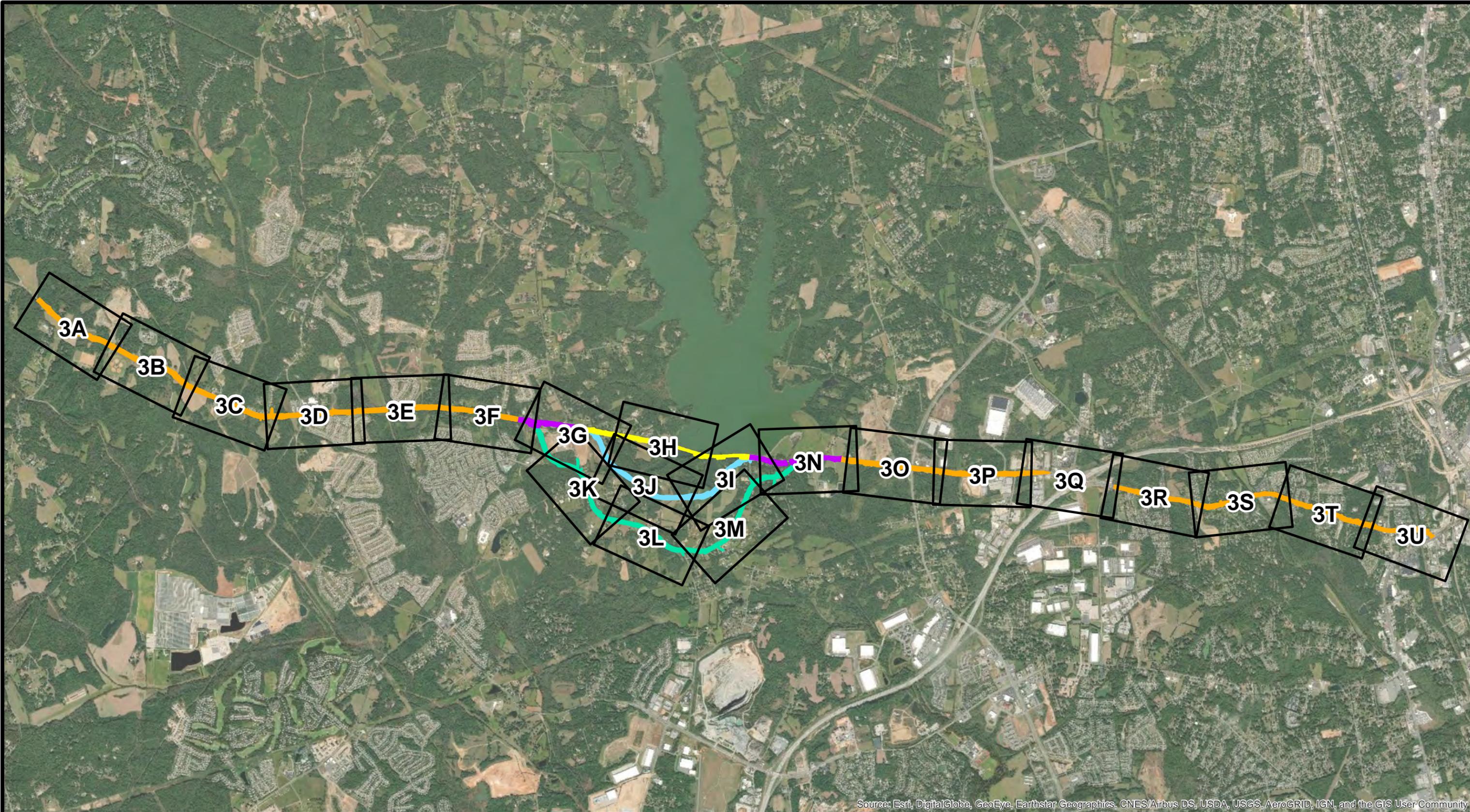
 **STUDY AREA**

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- KANNAPOLIS, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - CORNELIUS, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - CONCORD, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - ENOCHVILLE, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - MOORESVILLE, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - CHINA GROVE, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - LAKE NORMAN NORTH, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)
  - LAKE NORMAN SOUTH, NC 7.5 MINUTE QUADRANGLE (USGS, 2017)

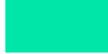


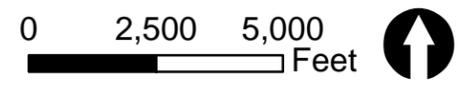
**Study Area Map**  
**Widening of NC 73 from Davidson-Concord Road to US 29**  
 TIP No: R-5706  
 WBS #: 46378.1.1  
 Mecklenburg and Cabarrus Counties  
 August 2018

**FIGURE 2**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

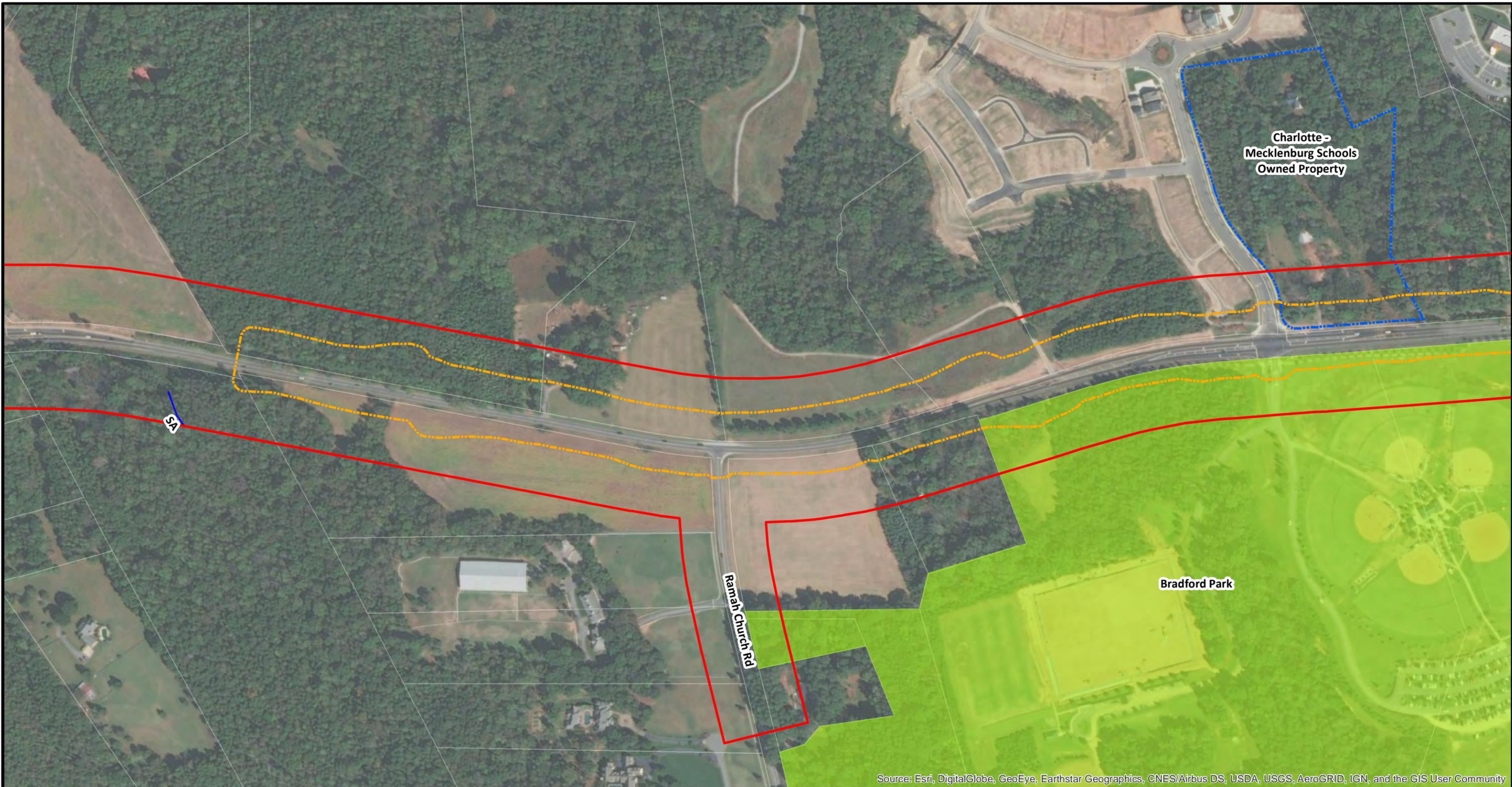
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|  Page Number            |  Concepts 1 and 2 |
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|  Concepts 1, 2 and 4    |  Concept 4        |



**Figure 3**

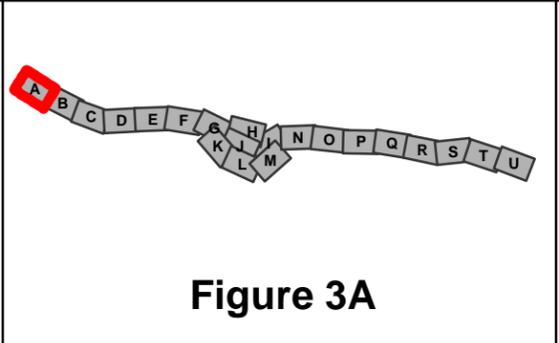
**Environmental Features Map**

R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
 Mecklenburg and Cabarrus Counties  
 September 2018



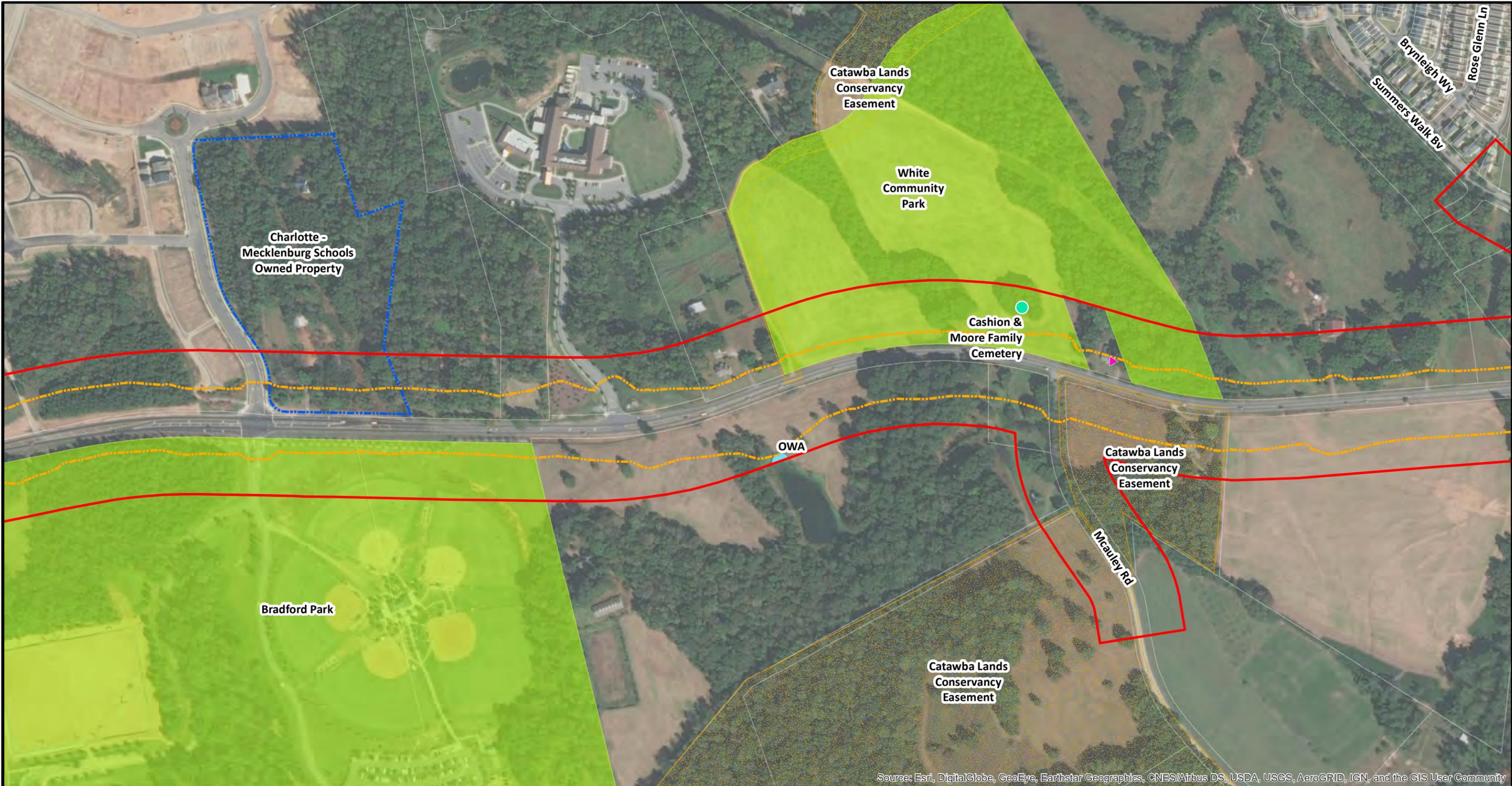
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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	Concepts 1, 2 and 4		Schools		Park & Recreational Space		Floodway
	Concepts 1 and 2		Cemeteries		VAD Parcels		Floodplains
	Concept 3		Places of Worship		Conservation Easements		Water Supply Watershed
	Concept 4		Local Landmarks		Delineated Streams		
	Study Area		Planned Greenways		Delineated Open Waters		



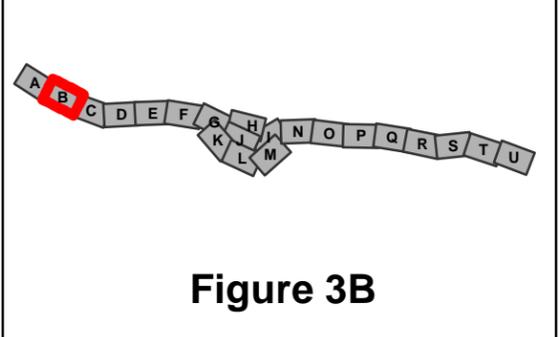
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 R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
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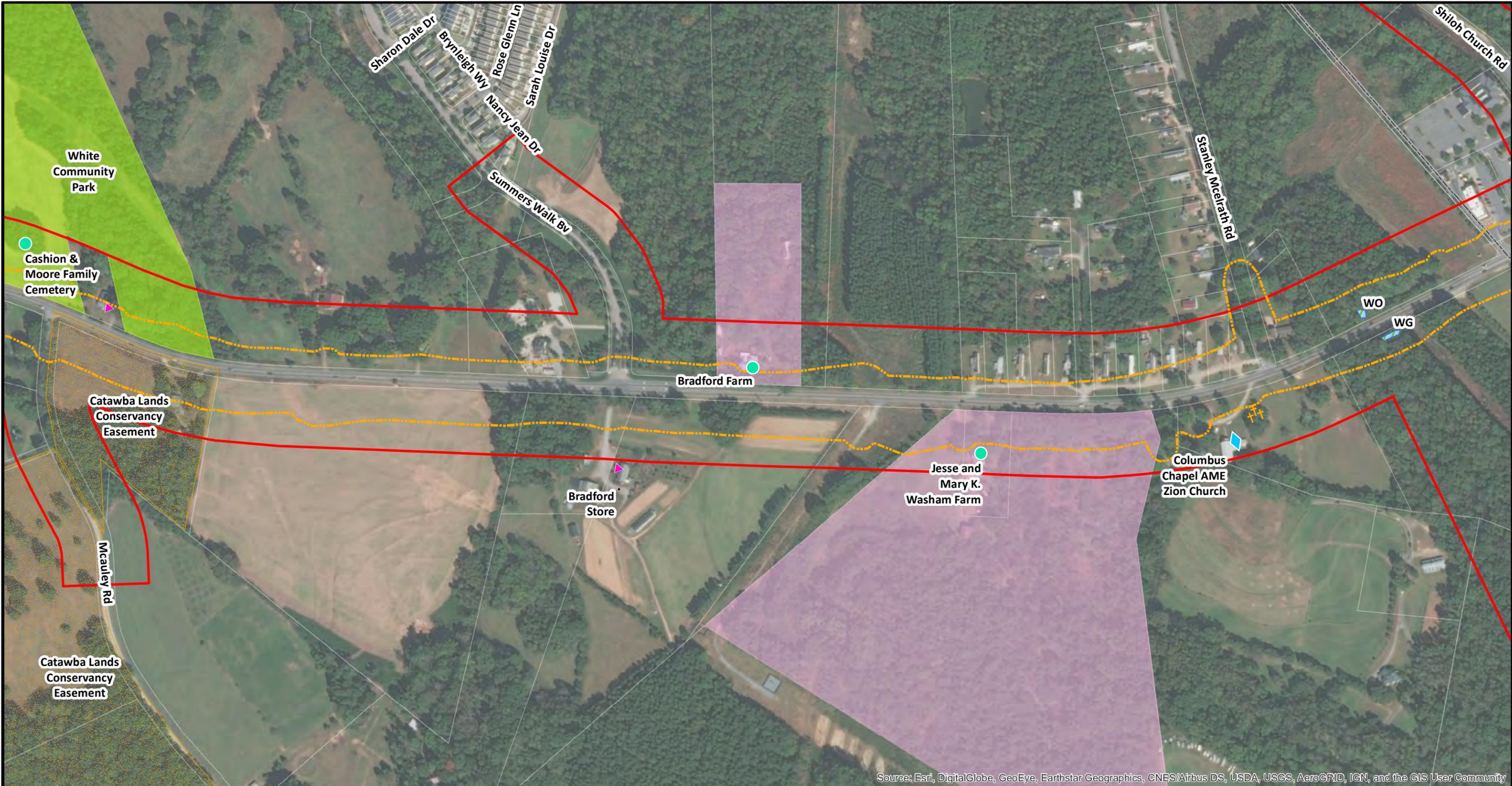
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### Environmental Features Map

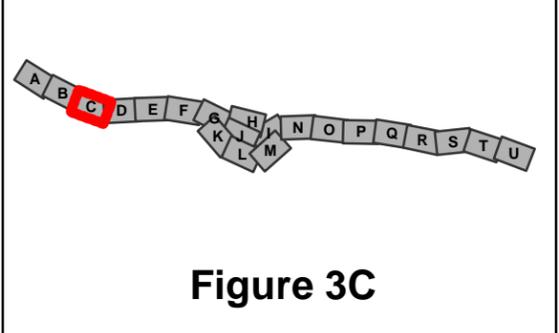
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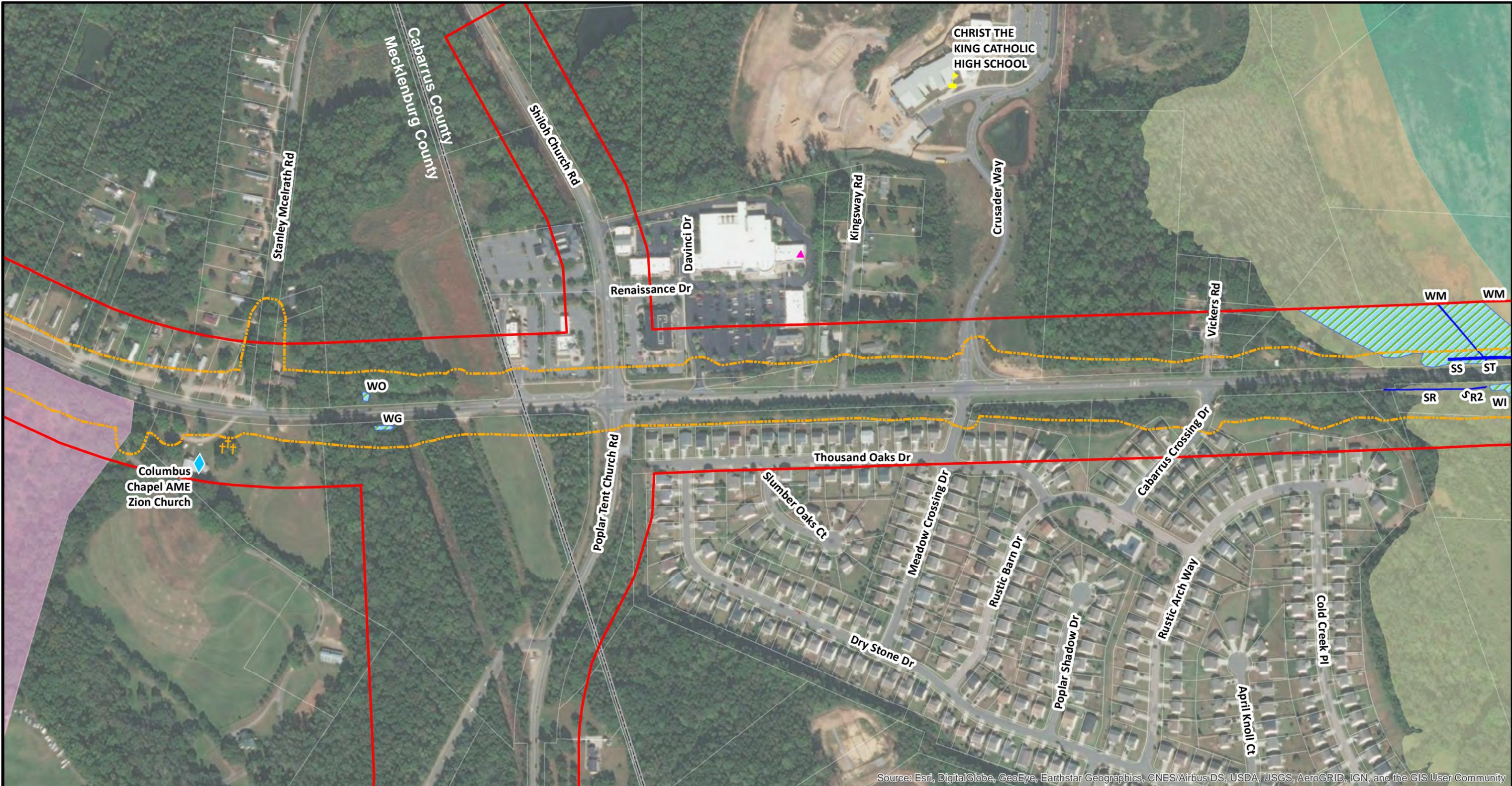
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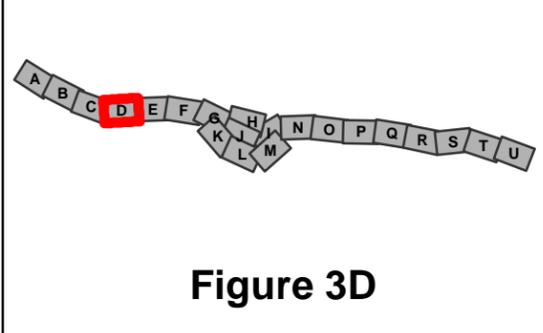
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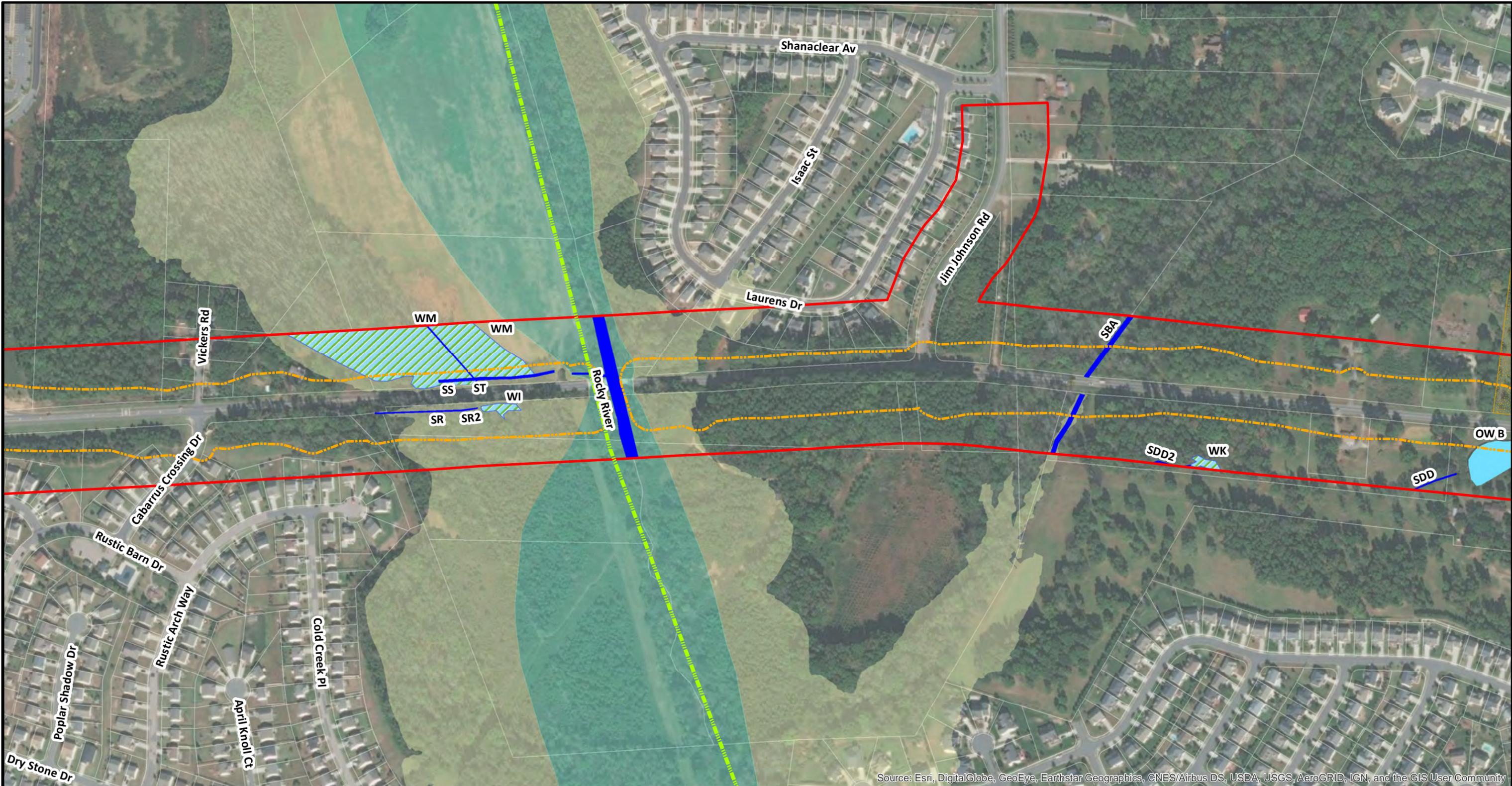
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**Figure 3D**

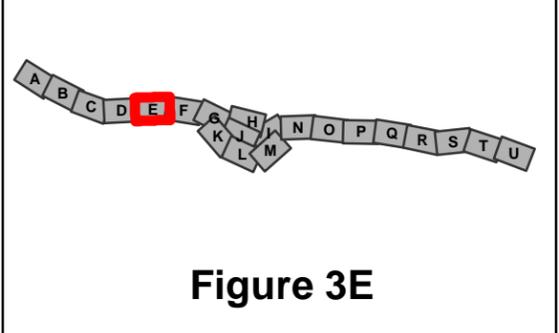
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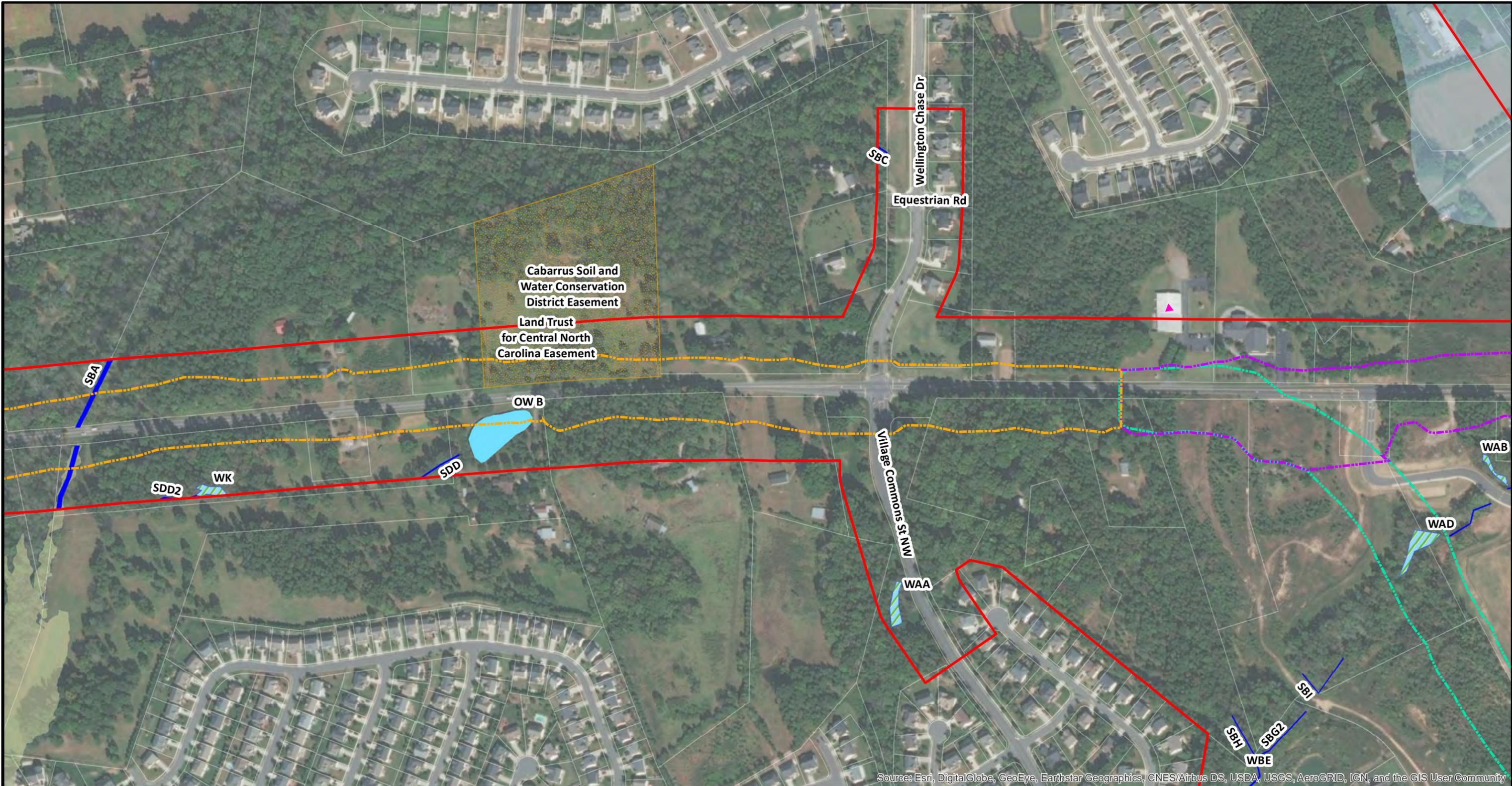
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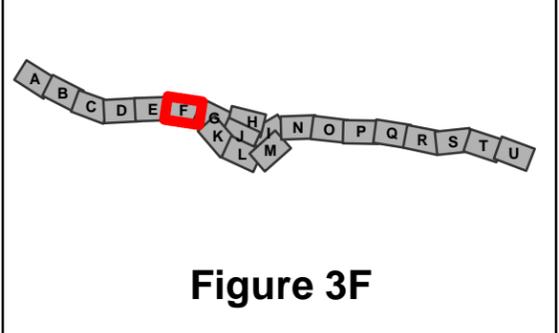
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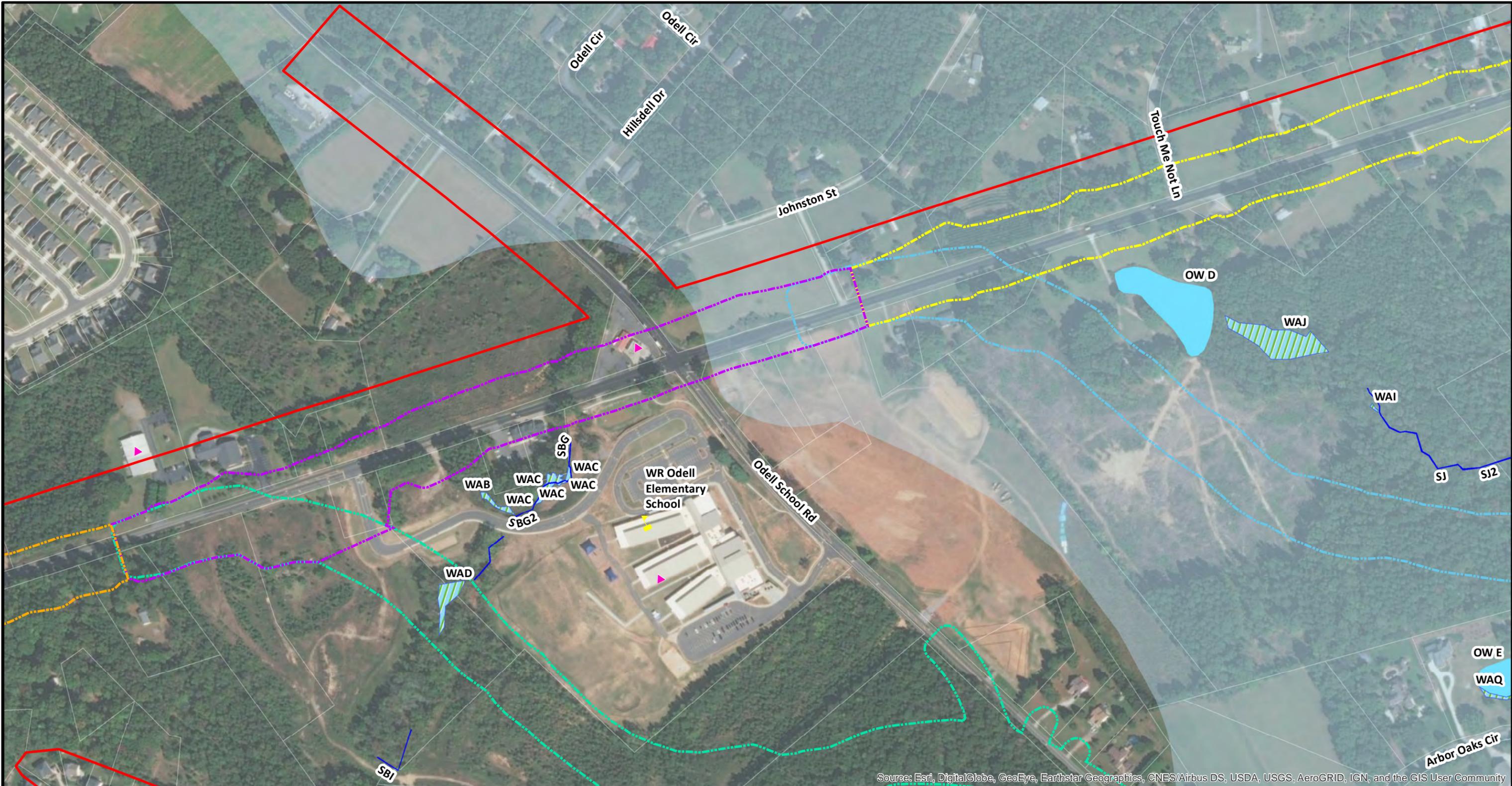
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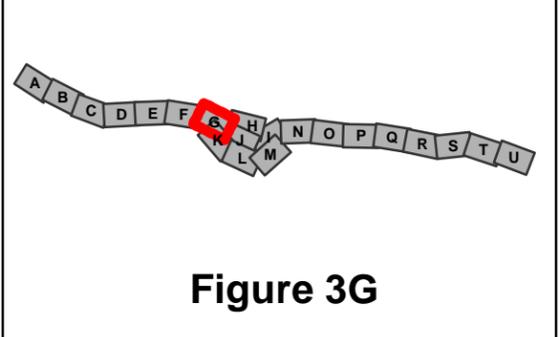
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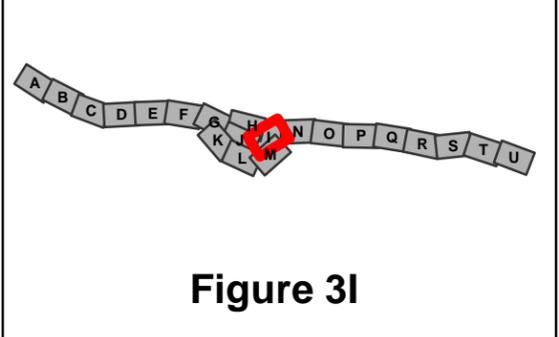
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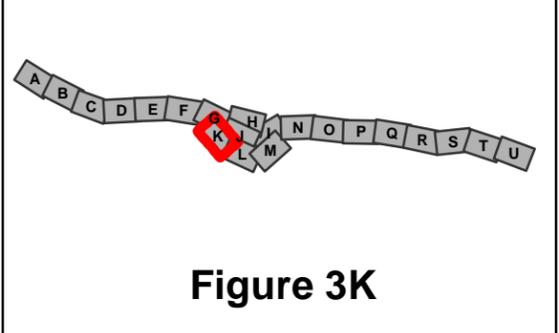
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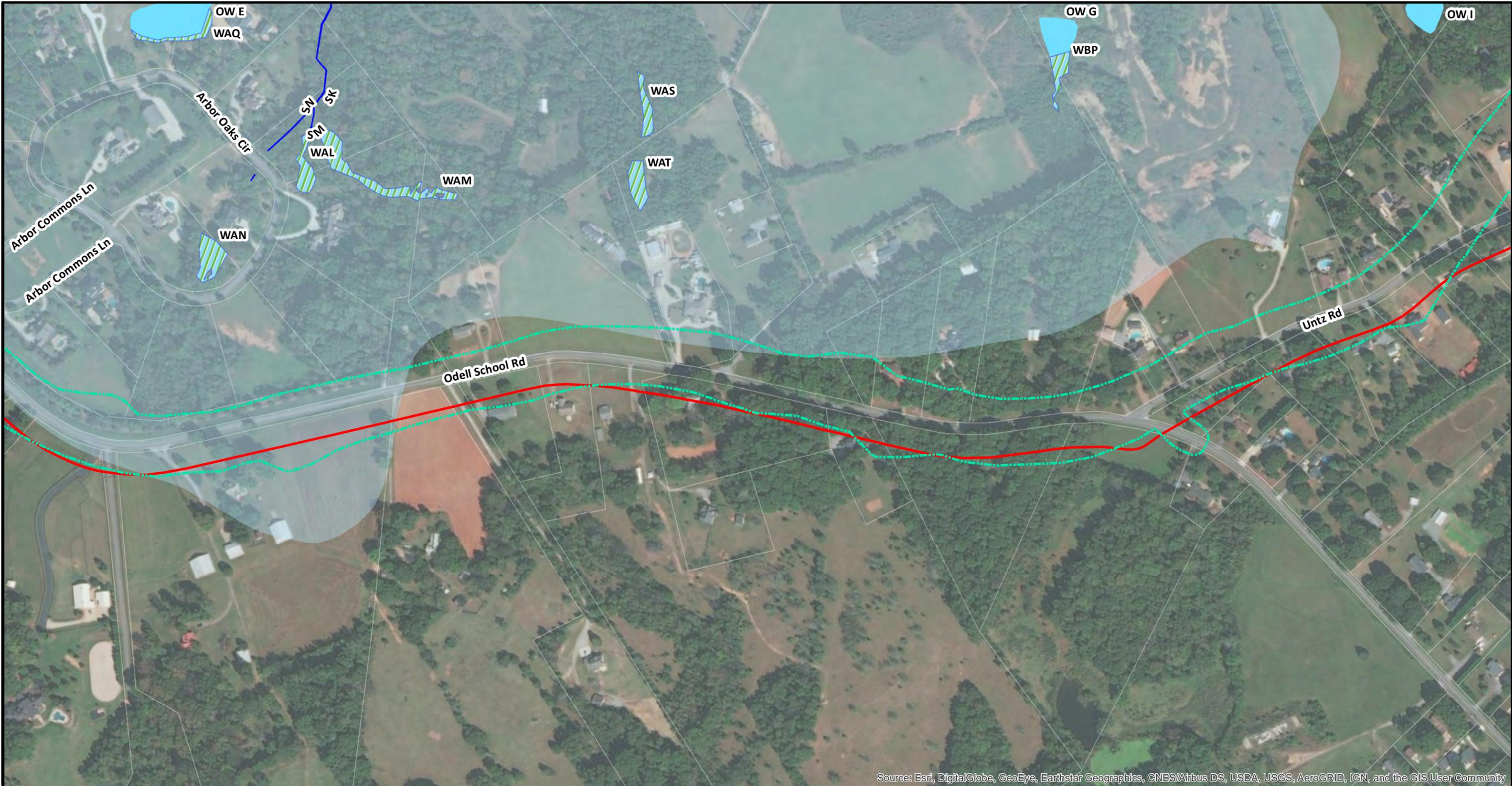
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### Environmental Features Map

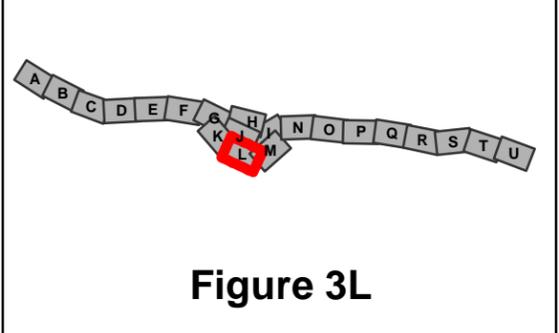
R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
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- |                        |                   |                              |                        |
|------------------------|-------------------|------------------------------|------------------------|
| Concepts 1, 2, 3 and 4 | HazMat            | Eligible Historic Properties | Delineated Wetlands    |
| Concepts 1, 2 and 4    | Schools           | Park & Recreational Space    | Floodway               |
| Concepts 1 and 2       | Cemeteries        | VAD Parcels                  | Floodplains            |
| Concept 3              | Places of Worship | Conservation Easements       | Water Supply Watershed |
| Concept 4              | Local Landmarks   | Delineated Streams           | Delineated Open Waters |
| Study Area             | Planned Greenways |                              |                        |



**Figure 3L**

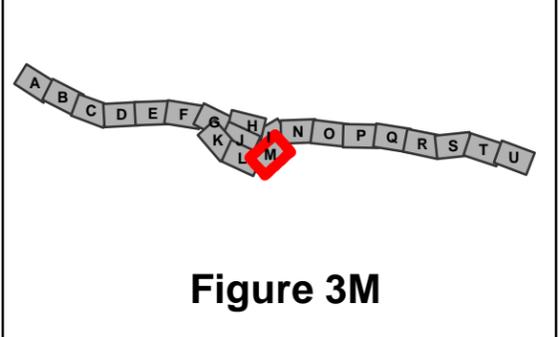
**Environmental Features Map**  
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 September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

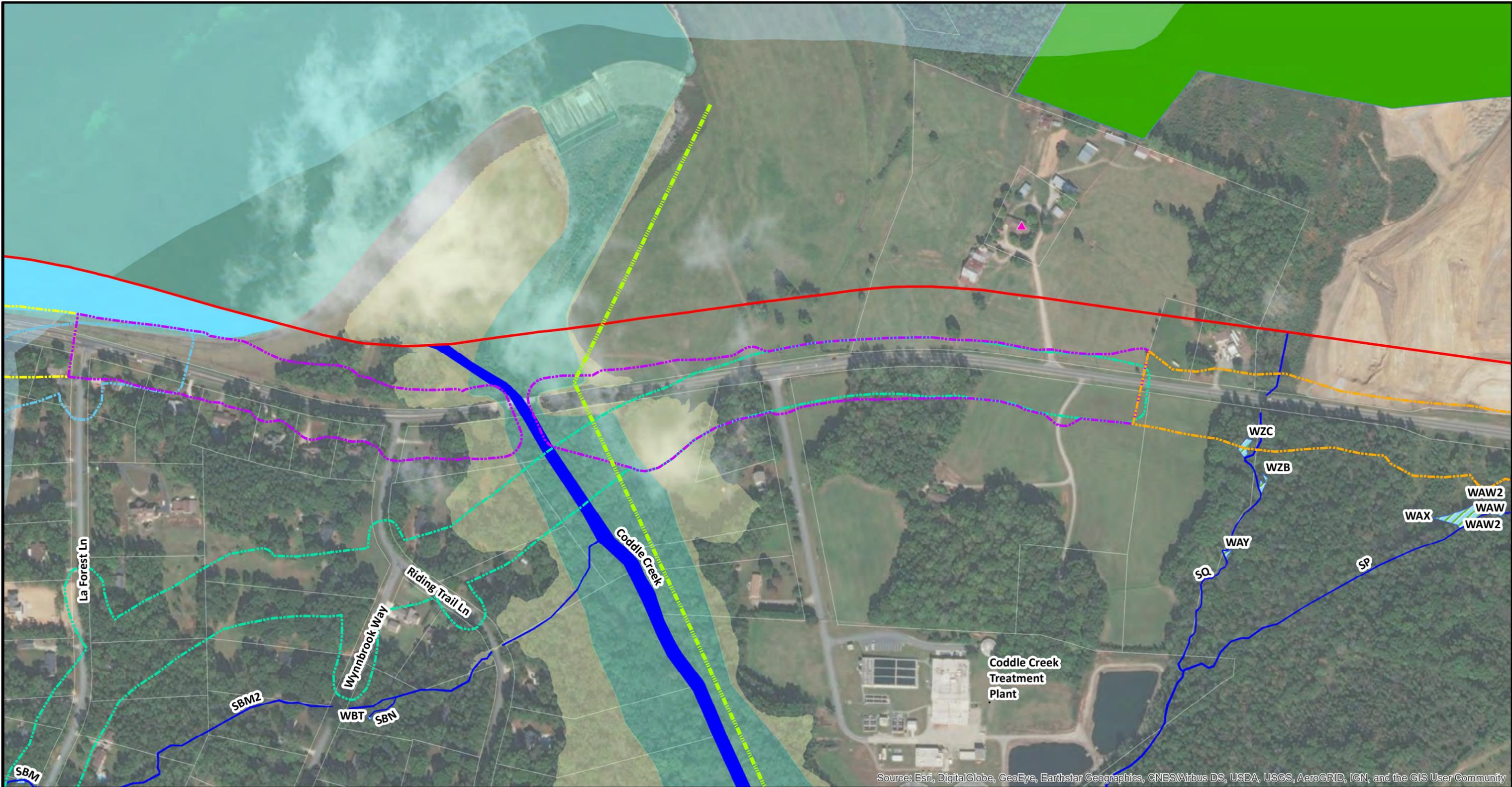
Concepts 1, 2, 3 and 4	HazMat	Eligible Historic Properties	Delineated Wetlands
Concepts 1, 2 and 4	Schools	Park & Recreational Space	Floodway
Concepts 1 and 2	Cemeteries	VAD Parcels	Floodplains
Concept 3	Places of Worship	Conservation Easements	Water Supply Watershed
Concept 4	Local Landmarks	Delineated Streams	Delineated Open Waters
Study Area	Planned Greenways		



### Environmental Features Map

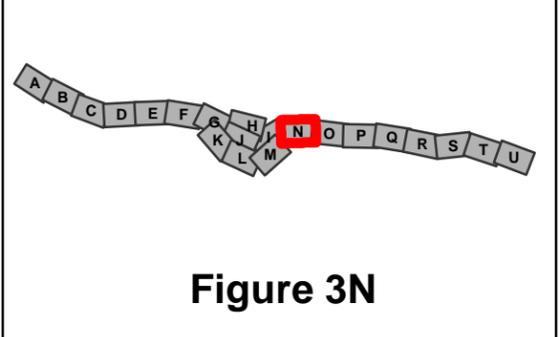
R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
Mecklenburg and Cabarrus Counties  
September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

	Concepts 1, 2, 3 and 4		HazMat		Eligible Historic Properties		Delineated Wetlands
	Concepts 1, 2 and 4		Schools		Park & Recreational Space		Floodway
	Concepts 1 and 2		Cemeteries		VAD Parcels		Floodplains
	Concept 3		Places of Worship		Conservation Easements		Water Supply Watershed
	Concept 4		Local Landmarks		Delineated Streams		
	Study Area		Planned Greenways		Delineated Open Waters		



### Environmental Features Map

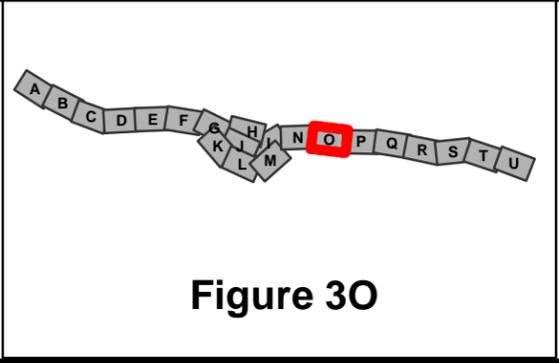
R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
Mecklenburg and Cabarrus Counties  
September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Concepts 1, 2, 3 and 4	HazMat	Eligible Historic Properties	Delineated Wetlands
Concepts 1, 2 and 4	Schools	Park & Recreational Space	Floodway
Concepts 1 and 2	Cemeteries	VAD Parcels	Floodplains
Concept 3	Places of Worship	Conservation Easements	Water Supply Watershed
Concept 4	Local Landmarks	Delineated Streams	Delineated Open Waters
Study Area	Planned Greenways		



**Figure 30**

### Environmental Features Map

R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
Mecklenburg and Cabarrus Counties  
September 2018

0 500 1,000 Feet





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

	Concepts 1, 2, 3 and 4		HazMat		Eligible Historic Properties		Delineated Wetlands
	Concepts 1, 2 and 4		Schools		Park & Recreational Space		Floodway
	Concepts 1 and 2		Cemeteries		VAD Parcels		Floodplains
	Concept 3		Places of Worship		Conservation Easements		Water Supply Watershed
	Concept 4		Local Landmarks		Delineated Streams		Delineated Open Waters
	Study Area		Planned Greenways				

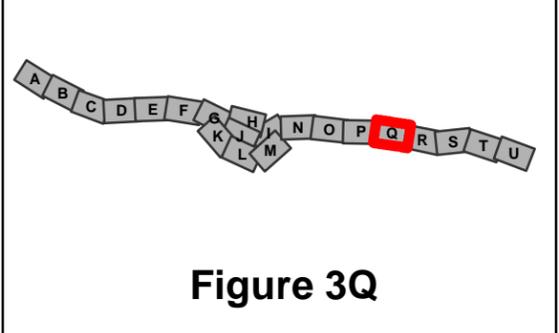


Figure 3Q

### Environmental Features Map

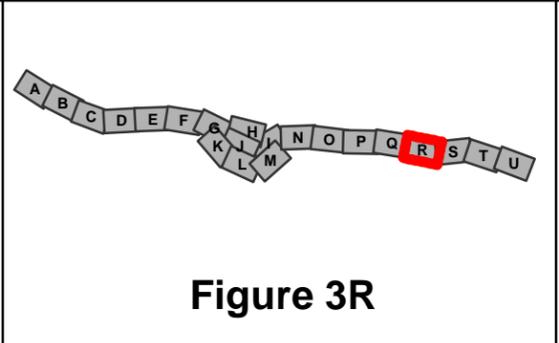
R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
Mecklenburg and Cabarrus Counties  
September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

	Concepts 1, 2, 3 and 4		HazMat		Eligible Historic Properties		Delineated Wetlands
	Concepts 1, 2 and 4		Schools		Park & Recreational Space		Floodway
	Concepts 1 and 2		Cemeteries		VAD Parcels		Floodplains
	Concept 3		Places of Worship		Conservation Easements		Water Supply Watershed
	Concept 4		Local Landmarks		Delineated Streams		Delineated Open Waters
	Study Area		Planned Greenways				

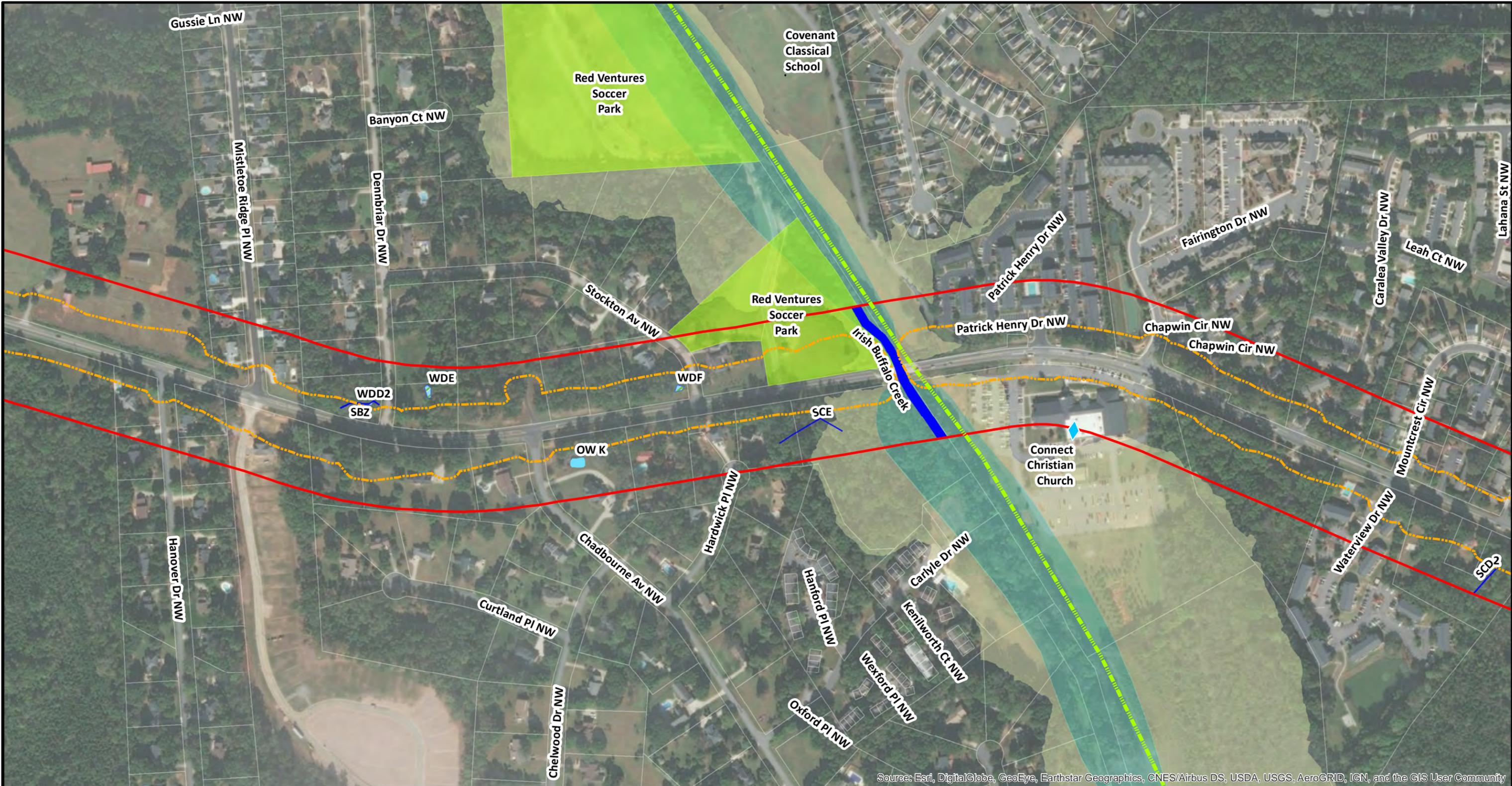


**Figure 3R**

### Environmental Features Map

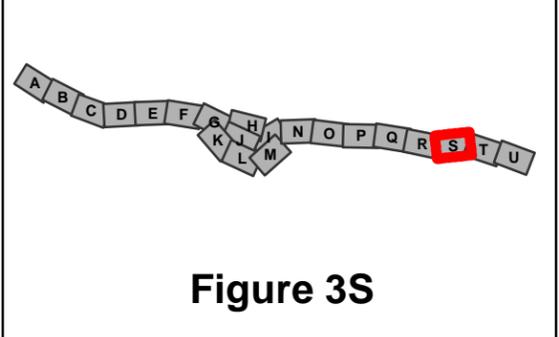
R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
 Mecklenburg and Cabarrus Counties  
 September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

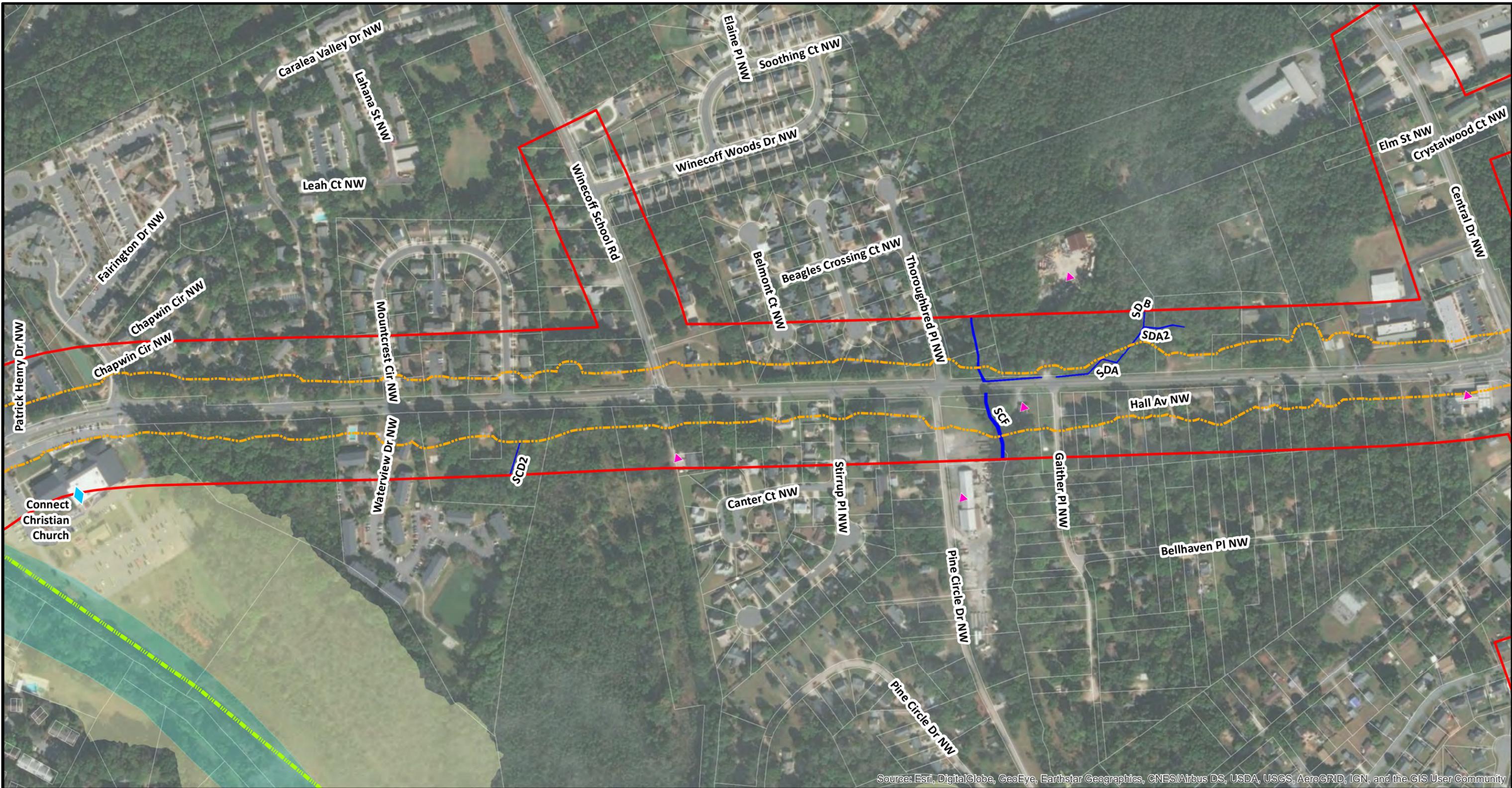
- |                        |                   |                              |                        |
|------------------------|-------------------|------------------------------|------------------------|
| Concepts 1, 2, 3 and 4 | HazMat            | Eligible Historic Properties | Delineated Wetlands    |
| Concepts 1, 2 and 4    | Schools           | Park & Recreational Space    | Floodway               |
| Concepts 1 and 2       | Cemeteries        | VAD Parcels                  | Floodplains            |
| Concept 3              | Places of Worship | Conservation Easements       | Water Supply Watershed |
| Concept 4              | Local Landmarks   | Delineated Streams           | Delineated Open Waters |
| Study Area             | Planned Greenways |                              |                        |



**Figure 3S**

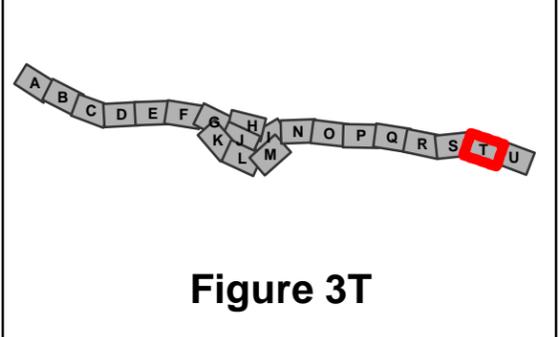
**Environmental Features Map**  
 R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
 Mecklenburg and Cabarrus Counties  
 September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

	Concepts 1, 2, 3 and 4		HazMat		Eligible Historic Properties		Delineated Wetlands
	Concepts 1, 2 and 4		Schools		Park & Recreational Space		Floodway
	Concepts 1 and 2		Cemeteries		VAD Parcels		Floodplains
	Concept 3		Places of Worship		Conservation Easements		Water Supply Watershed
	Concept 4		Local Landmarks		Delineated Streams		Delineated Open Waters
	Study Area		Planned Greenways				

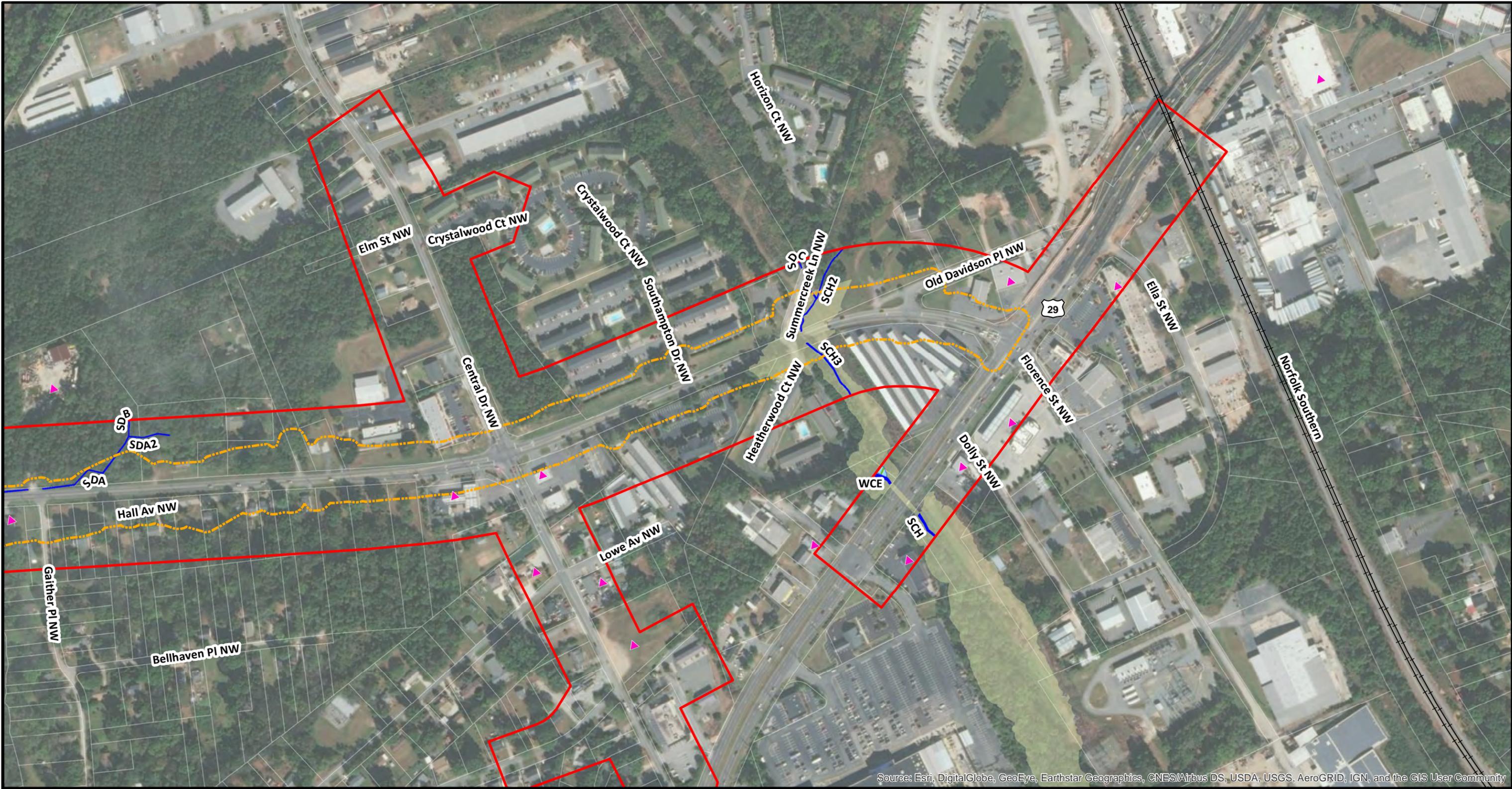


**Figure 3T**

### Environmental Features Map

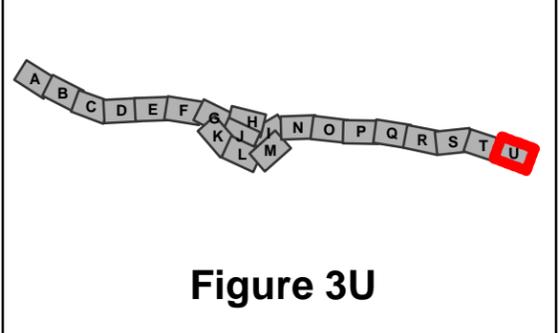
R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
Mecklenburg and Cabarrus Counties  
September 2018

0 500 1,000 Feet



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

	Concepts 1, 2, 3 and 4		HazMat		Eligible Historic Properties		Delineated Wetlands
	Concepts 1, 2 and 4		Schools		Park & Recreational Space		Floodway
	Concepts 1 and 2		Cemeteries		VAD Parcels		Floodplains
	Concept 3		Places of Worship		Conservation Easements		Water Supply Watershed
	Concept 4		Local Landmarks		Delineated Streams		Delineated Open Waters
	Study Area		Planned Greenways				



**Environmental Features Map**  
 R-5706 - NC 73 Widening from Davidson-Concord Road to US 29  
 Mecklenburg and Cabarrus Counties  
 September 2018

0 500 1,000 Feet

## Appendix A - Traffic Information

NC 73

	R-5706					
	2017 2-Lane		2040 2-Lane		2040 4-Lane	
	AM	PM	AM	PM	AM	PM
LOS	E	E	E	E	C	D

### Poplar Tent Road Intersection

		Traditional	CFI	Quadrant SW	Superstreet	No Build
AM	LOS	E	D	D	C	F
	Delay (sec)	66.48	42.82	45.30	30.01	239.74
PM	LOS	E	D	D	C	F
	Delay (sec)	75.41	45.52	42.02	32.49	207.89

### Odell School Road Intersection

		Traditional	CFI	Superstreet	No Build
AM	LOS	E	D	C	F
	Delay (sec)	79.86	46.06	24.29	90.80
PM	LOS	F	D	B	F
	Delay (sec)	91.18	44.64	19.55	111.07

### Kannapolis Parkway

		Traditional	CFI	Superstreet	Grade Separation				No Build
					Quadrant & Kannapolis	Quadrant & NC 73	U-Turn & Kannapolis	Southbound Right & NC 73	
AM	LOS	F	E	E	C	B	B	B	F
	Delay (sec)	86.82	59.69	65.21	22.50	13.90	10.80	10.7	112.06
PM	LOS	F	D	E	C	B	A	A	F
	Delay (sec)	89.68	46.72	71.57	33.30	15.20	8.50	8.70	113.69

### International Drive Northwest Intersection

		Traditional	Quadrant SE	Superstreet	Bowties			No Build	
					Main Intersection	East Leg	North Leg	South Leg	
AM	LOS	E	D	C	C	D	A	B	F
	Delay (sec)	57.61	44.54	33.56	31.71	43.06	7.60	12.47	84.63
PM	LOS	F	D	D	C	B	A	B	E
	Delay (sec)	102.48	45.04	43.99	27.60	14.39	4.60	16.39	66.95

### Wincoff School Road Intersection

		Traditional	CFI	Superstreet	No Build
AM	LOS	D	B	B	F
	Delay (sec)	54.57	16.82	13.55	360.16
PM	LOS	D	C	C	F
	Delay (sec)	54.57	26.35	23.45	204.28

### Central Drive Northwest Intersection

		Traditional	CFI	Superstreet	Bowties		No Build	
					Main Intersection	North Roundabout	South Roundabout	
AM	LOS	F	D	C	C	A	A	F
	Delay (sec)	153.48	48.91	29.74	30.50	9.20	8.10	249.95
PM	LOS	F	D	C	C	A	A	F
	Delay (sec)	153.48	48.46	20.68	24.60	8.10	8.60	125.53

## Appendix B – Jurisdictional Features

Table B1 - Water Resources in the Study Area

Stream Name	Map ID	NCDWR Index Number	Best Usage Classification
Afton Run	Afton Run	13-17-6-6	C
Coddle Creek	Coddle Creek	13-17-6-(5.5)	WSII; HQW, CA
Irish Buffalo Creek	Irish Buffalo Creek	13-17-9-(2)	C
Rocky River	Rocky River	13-17	C
UT to Ramah Creek	SA	13-17-4-4	C
UT to Coddle Creek Reservoir (Lake Howell)	SJ	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek Reservoir (Lake Howell)	SK	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek Reservoir (Lake Howell)	SM	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek Reservoir (Lake Howell)	SN	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek Reservoir (Lake Howell)	SO	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek	SP	13-17-6-(5.5)	C
UT to Coddle Creek	SQ	13-17-6-(5.5)	C
UT to Rocky River	SR	13-17	C
UT to Rocky River	SS	13-17	C
UT to Rocky River	ST	13-17	C
UT to Rocky River	SBA	13-17	C
UT to Rocky River	SBC	13-17	C
UT to Rocky River	SBD	13-17	C
UT to Rocky River	SBE	13-17	C
UT to Rocky River	SBF	13-17	C
UT to Rocky River	SBG	13-17	C
UT to Rocky River	SBH	13-17	C
UT to Rocky River	SBI	13-17	C
UT to Coddle Creek Reservoir	SBJ	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek Reservoir	SBK	13-17-6-(1.5)	WSII; HQW, CA
UT to Coddle Creek	SBL	13-17-6-(5.5)	C
UT to Coddle Creek	SBM	13-17-6-(5.5)	C
UT to Coddle Creek	SBN	13-17-6-(5.5)	C
UT to Coddle Creek	SBP	13-17-6-(5.5)	C
UT to Coddle Creek	SBQ	13-17-6-(5.5)	C
UT to Coddle Creek	SBR	13-17-6-(5.5)	C
UT to Coddle Creek	SBS	13-17-6-(5.5)	C
UT to Coddle Creek	SBT	13-17-6-(5.5)	C
UT to Coddle Creek	SBU	13-17-6-(5.5)	C
UT to Afton Run	SBV	13-17-6-6	C
UT to Afton Run	SBW	13-17-6-6	C
UT to Irish Buffalo Creek	SBY	13-17-9-(2)	C
UT to Irish Buffalo Creek	SBZ	13-17-9-(2)	C
UT to Afton Run	SCA	13-17-6-6	C
UT to Afton Run	SCB	13-17-6-6	C

Table B1 (continued) - Water Resources in the Study Area

Stream Name	Map ID	NCDWR Index Number	Best Usage Classification
UT to Afton Run	SCC	13-17-6-6	C
UT to Irish Buffalo Creek	SCD	13-17-9-(2)	C
UT to Irish Buffalo Creek	SCD2	13-17-9-(2)	C
UT to Irish Buffalo Creek	SCE	13-17-9-(2)	C
UT to Irish Buffalo Creek	SCF	13-17-9-(2)	C
UT to Irish Buffalo Creek	SCH	13-17-9-(2)	C
UT to Irish Buffalo Creek	SDA	13-17-9-(2)	C
UT to Irish Buffalo Creek	SDB	13-17-9-(2)	C
UT to Irish Buffalo Creek	SDC	13-17-9-(2)	C
UT to Rocky River	SDD	13-17-9-(2)	C
UT to Irish Buffalo Creek	SHW	13-17-9-(2)	C
UT to Coddle Creek	PSA	13-17-9-(2)	C
UT to Coddle Creek	PSB	13-17-9-(2)	C
UT to Coddle Creek	PSC	13-17	C
UT to Coddle Creek	PSD	13-17-9-(2)	C

Table B2 - Physical Characteristics of Water Resources in the Study Area

Map ID	Bank Height (ft)	Bankfull Width (ft)	Water Depth (in)	Channel Substrate	Velocity	Clarity
Afton Run	2-10	6	6-18	Sand, gravel	Fast	Turbid
Coddle Creek	2-6	40	24	Sand, gravel, cobble	Slow	Turbid
Irish Buffalo	2-15	15	10	Sand, gravel, cobble	Moderate	Turbid
Rocky River	1-2	35	6-24	Sand, gravel, cobble	Moderate	Turbid
SA	1	2-3	5-10	Sand	Slow	Clear
SJ	4	3	2-3	Sand	Moderate	Clear
SK	5-10	4	12	Sand	Slow	Turbid
SM	6	2	7	Sand	Slow	Clear
SN	1-3	2	7	Sand	Slow	Clear
SO	3-12	4	7	Cobble, bedrock	Slow	Clear
SP	1-4	3	7	Sand	Slow	Clear
SQ	12-15	5-6	6	Sand, gravel	Moderate	Clear
SR	3-6	3	0-6	Sand	Slow	Clear
SS	1	6	1-6	Sand	Slow	Clear
ST	2	4-8	6-12	Sand, cobble	Slow/Moderate	Clear
SBA	6	10-12	1-18	Sand	Moderate	Turbid
SBD	1	3-4	0-2	Sand, gravel, cobble	Slow	Clear/Turbid
SBE	1	2-3	0-2	Sand	Slow	Turbid
SBF	1	2-3	0-2	Sand	Slow	Turbid
SBG	2-4	2-4	0-4	Sand	Slow	Turbid
SBH	2-3	1-2	0-2	Sand	Slow	Turbid
SBI	1	1-2	0-2	Sand	Slow	Turbid
SBJ	2-10	2-6	2-6	Sand, gravel, cobble	Slow	Turbid
SBK	2-10	2-6	1-4	Sand, gravel, cobble	Slow	Turbid
SBL	2-6	2-4	1-4	Sand, gravel, cobble	Slow	Turbid
SBM	2-15	2-8	1-4	Sand, cobble	Slow	Clear
SBN	1-2	2-3	1-2	Sand, gravel, cobble	Slow	Clear
SBP	1	2	0-2	Sand	Slow	Clear
SBQ	4	3	0-2	Sand	Slow	Clear
SBR	5-10	2-4	0-4	Sand	Slow	Clear
SBS	6	2	0-1	Sand	Slow	Clear
SBT	1-3	2	0-2	Sand	Slow	Clear
SBU	3-12	2	0-2	Sand	Slow	Clear
SBV	1-4	2-3	0-4	Sand	Slow	Clear
SBW	12-15	2-3	0-4	Sand	Slow	Clear

Table B2 (continued) - Physical Characteristics of Water Resources in the Study Area

Map ID	Bank Height (ft)	Bankfull Width (ft)	Water Depth (in)	Channel Substrate	Velocity	Clarity
SBY	3-6	2-3	0-2	Sand	Slow	Clear
SBZ	1	2-4	0-4	Sand, gravel	Slow	Clear
SCA	2	2	0-6	Gravel, cobble	Slow	Turbid
SCB	6	10	2-4	Sand, gravel	Moderate	Turbid
SCC	2	5	10	Sand	Moderate	Turbid
SCD	1	2	12	Sand, gravel	Moderate	Turbid
SCD2	1	2	0-2	Sand	Slow	Turbid
SCE	1	2	8	Gravel, cobble	Fast	Clear
SCF	5	8-10	1-3	Sand, gravel	Fast	Turbid
SCH	3	5-7	6-18	Sand, gravel, cobble	Moderate	Turbid
SDA	1	2-3	1-3	Sand, gravel	Slow	Clear
SDB	3-4	2	0-4	Sand, gravel	Slow	Turbid
SDC	3-5	4-6	2-4	Sand, cobble	Moderate	Turbid
SDD	1-3	1-3	0-4	Sand, gravel	None	Turbid
SHW	1	3-4	1-4	Sand, gravel	Moderate	Clear

Table B3 - Jurisdictional Characteristics of Water Resources in the Study Area

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required	River Basin Buffer
Afton Run	3283	Perennial	Yes	NA
Coddle Creek	5846	Perennial	Yes	NA
Irish Buffalo	556	Perennial	Yes	NA
Rocky River	509	Perennial	Yes	NA
SA	132	Intermittent	Yes	NA
SJ	561(I)/654(P)	Intermittent/Perennial	Yes	NA
SK	1400	Perennial	Yes	NA
SM	4	Intermittent	Yes	NA
SN	85	Intermittent	Yes	NA
SO	885	Perennial	Yes	NA
SP	1378	Intermittent	Yes	NA
SQ	2562	Intermittent	Yes	NA
SR	304(I)/70(P)	Intermittent/Perennial	Yes	NA
SS	122	Perennial	Yes	NA
ST	624	Perennial	Yes	NA
SBA	494	Perennial	Yes	NA
SBC	39	Intermittent	Yes	NA
SBD	1641	Intermittent	Yes	NA
SBE	117	Intermittent	Yes	NA
SBF	28	Intermittent	Yes	NA
SBG	1495(I)/143(P)	Intermittent/Perennial	Yes	NA
SBH	163	Intermittent	Yes	NA
SBI	85	Intermittent	Yes	NA
SBJ	1340	Perennial	Yes	NA
SBK	272	Intermittent	Yes	NA
SBL	143	Intermittent	Yes	NA
SBM	1371(I)/1895(P)	Intermittent/Perennial	Yes	NA
SBN	123	Perennial	Yes	NA
SBP	216	Intermittent	Yes	NA
SBQ	928	Intermittent	Yes	NA
SBR	1921	Intermittent	Yes	NA
SBS	398	Intermittent	Yes	NA
SBT	60	Intermittent	Yes	NA
SBU	45	Intermittent	Yes	NA
SBV	421	Intermittent	Yes	NA
SBW	419	Intermittent	Yes	NA
SBY	116	Intermittent	Yes	NA
SBZ	146	Intermittent	Yes	NA
SCA	1814	Intermittent	Yes	NA
SCB	593	Perennial	Yes	NA
SCC	226	Perennial	Yes	NA
SCD	243	Intermittent	Yes	NA

Table B3 (continued) - Jurisdictional Characteristics of Water Resources in the Study Area

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required	River Basin Buffer
SCD2	124	Intermittent	Yes	NA
SCE	255	Intermittent	Yes	NA
SCF	477	Perennial	Yes	NA
SCH	742	Perennial	Yes	NA
SDA	146(I)/594(P)	Intermittent/Perennial	Yes	NA
SDB	55	Intermittent	Yes	NA
SDC	68	Perennial	Yes	NA
SDD	254	Intermittent	Yes	NA
SHW	146	Intermittent	Yes	NA
Total	38,731			

Table B4 - North Carolina Stream Assessment Method Classification

Map ID	Functional Ratings
Afton Run	M-LHM
Coddle Creek	L-LLL
Irish Buffalo	M-LHM
Rocky River	M-LHM
SA	L-LHL
SJ-1	M-LHM
SJ-2	L-LHL
SK	M-LHM
SM	M-LMH
SN	M-LHM
SO	M-LHM
SP-1	M-HMM
SP-2	L-LLM
SP-3	H-LHH
SQ-1	H-HHM
SQ-2	H-HMH
SQ-3	L-LHL
SQ-4	L-LML
SQ-5	L-LHL
SR-1	L-LML
SR-2	L-LML
SS	L-LML
ST-1	L-LML
ST-2	L-LLL
SBA-1	L-LML
SBA-2	L-LLL
SBC	L-LLM
SBD-1	L-LHL
SBD-2	L-LHL
SBE	L-LML
SBF	L-LML
SBG-1	M-LMH
SBG-2	L-HLL
SBG-3	L-MLL
SBG-4	L-LLL
SBG-5	M-MML
SBG-6	M-LMH
SBH	L-LML
SBI	L-LLL
SBJ-1	M-LMM
SBJ-2	L-LLL
SBK	H-MHH

Table B4 (continued) - North Carolina Stream Assessment Method Classification

Map ID	Functional Ratings
SBL	M-LHM
SBM-1	M-LMM
SBM-2	M-HML
SBM-3	L-MLL
SBM-4	L-LML
SBM-5	L-LHL
SBN	M-HMM
SBP	H-HHH
SBQ-1	M-MML
SBQ-2	L-LHL
SBR-1	L-LML
SBR-2	L-LML
SBS	M-HML
SBT	M-HML
SBU	L-LML
SBV	H-HHM
SBW	M-LMM
SBY	L-LLM
SBZ	H-HMH
SCA-1	L-LLH
SCA-2	M-MLM
SCA-3	H-HHM
SCA-4	M-MMM
SCB	L-LML
SCC	M-MML
SCD	M-LMM
SCD2	M-HLM
SCE	H-HHH
SCF-1	L-LML
SCF-2	L-LLL
SCF-3	L-LML
SCF-4	M-MMM
SCB	L-LML
SCC	M-MML
SCD	M-LMM
SCD2	M-HLM
SCE	H-HHH
SCF-1	L-LML
SCF-2	L-LLL
SCH-1	L-LML
SCH-2	L-LLL
SCH-3	M-LMH
SDA-1	M-MMH
SDA-2	H-HHL

Table B4 (continued) - North Carolina Stream Assessment Method Classification

Map ID	Functional Ratings
SDA-3	L-LML
SDB	M-MMH
SDC	L-LLL
SDD-1	L-LLL
SDD-2	L-LLL
SHW	M-MLM

Table B5 - Jurisdictional Characteristics of Wetlands in the Study Area

Map ID	NCWAM Classification	Hydrologic Classification	NCWAM Wetland Ratings	Area (ac.)
WG	Headwater Forest	Riparian	L-MLL	<0.1
WI	Bottomland Hardwood Forest	Riparian	M-MMM	<0.1
WK	Headwater Forest	Riparian	M-MML	<0.1
WM	Riverine Swamp Forest	Riparian	WM-1, H-HHM	2.7
			WM-2, L-LML	
WO	Headwater Forest	Riparian	H-HHL	<0.1
WAB	Headwater Forest	Riparian	M-MML	<0.1
WAC	Headwater Forest	Riparian	L-LLL	<0.1
WAD	Riverine Swamp Forest	Riparian	M-MMM	0.2
WAE	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WAF	Riverine Swamp Forest	Riparian	H-HHH	0.1
WAG	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WAH	Headwater Forest	Riparian	H-HHH	0.8
WAI	Headwater Forest	Riparian	H-HHH	<0.1
WAJ	Headwater Forest	Riparian	H-HHH	0.6
WAK	Headwater Forest	Riparian	L-LLM	<0.1
WAL	Headwater Forest	Riparian	M-MMH	0.2
WAM	Headwater Forest	Riparian	M-MMH	0.5
WAN	Headwater Forest	Riparian	L-LLM	0.2
WAO	Headwater Forest	Riparian	H-HHH	<0.1
WAP	Headwater Forest	Riparian	H-HHH	<0.1
WAQ	Riverine Swamp Forest	Riparian	L-MLL	0.1
WAR	Headwater Forest	Riparian	H-HHM	<0.1
WAS	Headwater Forest	Riparian	H-HHM	0.1
WAT	Headwater Forest	Riparian	L-MLL	0.2
WAU	Riverine Swamp Forest	Riparian	H-HHL	0.1
WAV	Headwater Forest	Riparian	L-LML	<0.1
WAV-2	Headwater Forest	Riparian	L-MLL	<0.1
WAW	Headwater Forest	Riparian	L-MLL	<0.1
WAW-2	Headwater Forest	Riparian	L-MLL	<0.1
WAX	Headwater Forest	Riparian	L-MLL	0.1
WAY	Headwater Forest	Riparian	L-LLL	<0.1
WAZ	Headwater Forest	Riparian	L-LLL	0.1
WBB	Headwater Forest	Riparian	H-HHH	<0.1
WBC	Headwater Forest	Riparian	H-HHH	<0.1
WBD	Basin Wetland	Non-riparian	M-HMM	0.1
WBE	Headwater Forest	Riparian	H-HHH	<0.1
WBE-2	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WBF	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WBG	Riverine Swamp Forest	Riparian	H-HHL	0.1
WBH	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WBI	Riverine Swamp Forest	Riparian	H-HHL	0.1

Table B5 (continued) - Jurisdictional Characteristics of Wetlands in the Study Area

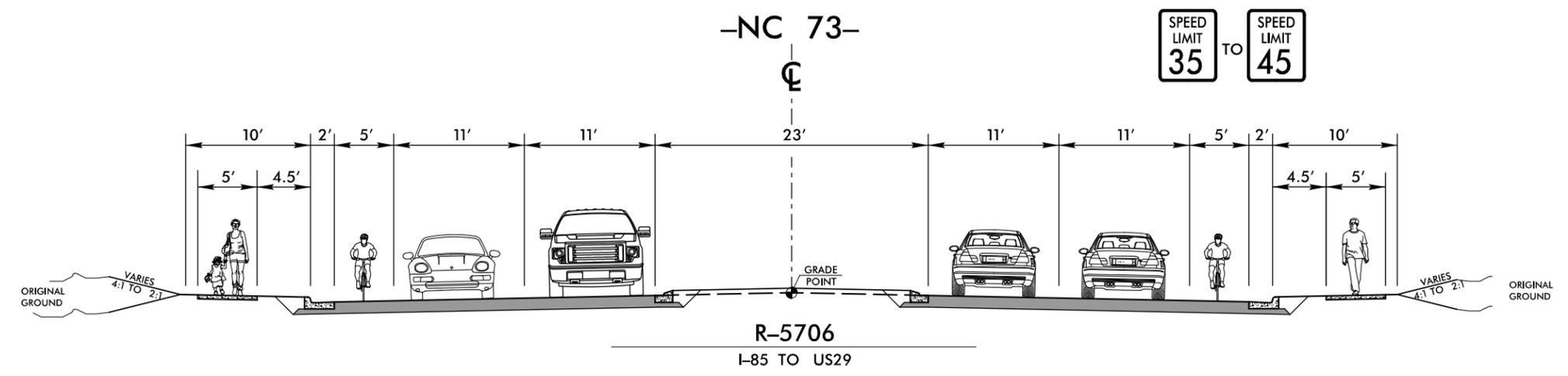
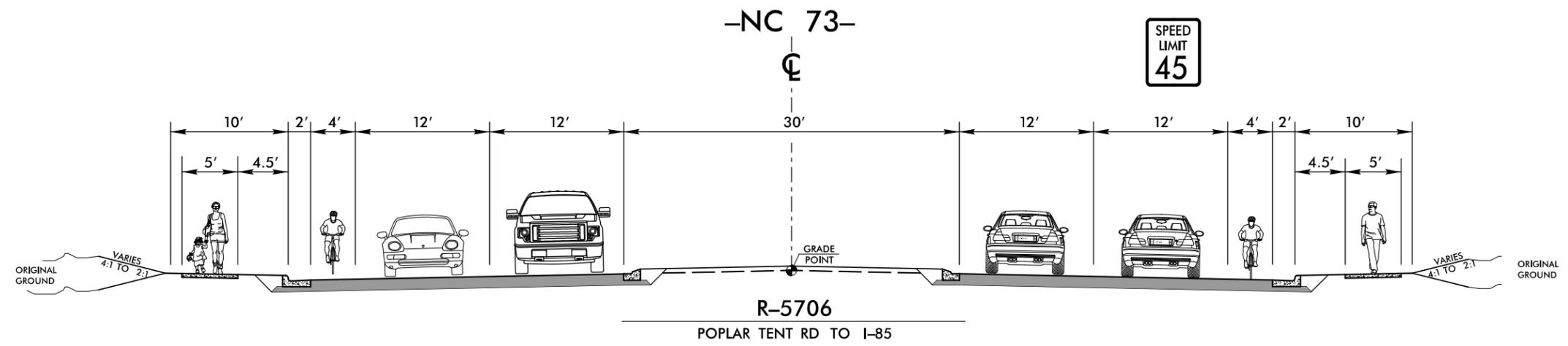
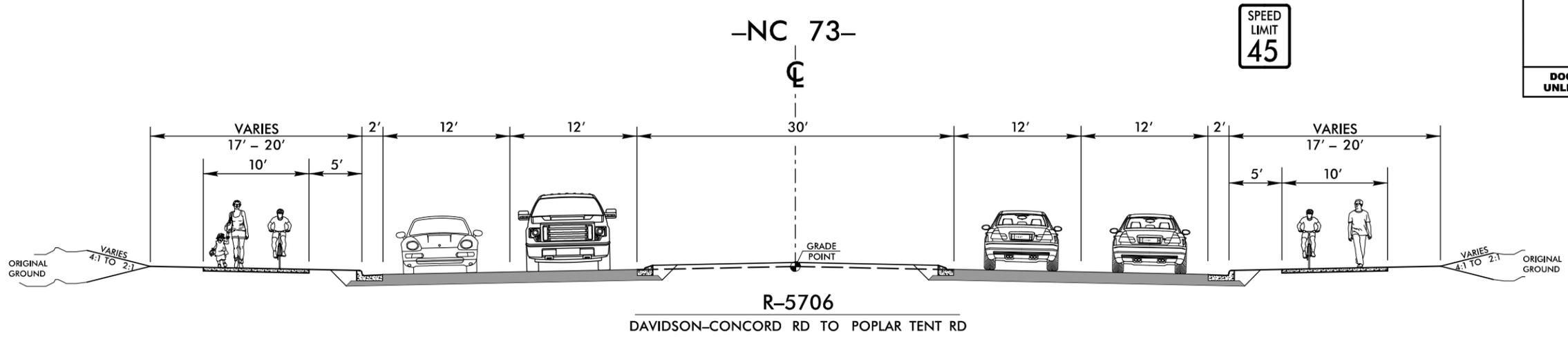
Map ID	NCWAM Classification	Hydrologic Classification	NCWAM Wetland Ratings	Area (ac.)
WBJ	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WBK	Seep	Non-riparian	M-HML	0.1
WBL	Headwater Forest	Riparian	M-MML	0.2
WBM	Riverine Swamp Forest	Riparian	L-MLL	0.1
WBN	Headwater Forest	Riparian	L-LLL	<0.1
WBO	Headwater Forest	Riparian	M-MML	0.1
WBP	Riverine Swamp Forest	Riparian	LMLL	0.1
WBQ	Riverine Swamp Forest	Riparian	H-HHL	<0.1
WBR	Headwater Forest	Riparian	M-HMM	0.4
WBS	Headwater Forest	Riparian	M-HML	<0.1
WBT	Headwater Forest	Riparian	L-LLL	<0.1
WBU	Headwater Forest	Riparian	H-HHH	<0.1
WBV	Headwater Forest	Riparian	L-HLL	<0.1
WBV-2	Headwater Forest	Riparian	L-HLL	<0.1
WBW	Headwater Forest	Riparian	H-HHH	<0.1
WBX	Headwater Forest	Riparian	H-HHH	<0.1
WBY	Riverine Swamp Forest	Riparian	L-LLL	0.1
WBZ	Headwater Forest	Riparian	L-LML	0.6
WCA	Headwater Forest	Riparian	L-MLL	0.1
WCB	Riverine Swamp Forest	Riparian	M-MLM	0.7
WCE	Bottomland Hardwood Forest	Riparian	M-MLM	<0.1
WDA	Bottomland Hardwood Forest	Riparian	L-LML	1.4
WDB	Bottomland Hardwood Forest	Riparian	M-MMM	<0.1
WDD	Headwater Forest	Riparian	H-HMH	<0.1
WDD-2	Headwater Forest	Riparian	M-MLH	<0.1
WDE	Basin Wetland	Non-riparian	M-HMM	<0.1
WDF	Basin Wetland	Non-riparian	M-HMM	<0.1
WDO	Headwater Forest	Riparian	M-MLH	<0.1
WZA	Non-tidal Freshwater Marsh	Riparian	WZA-1, H-HHH	5.6
	Riverine Swamp Forest		WZA-2, H-HHH	
	Bottomland Hardwood Forest		WZA-3, H-HHH	
WZB	Headwater Forest	Riparian	H-HHL	<0.1
WZC	Headwater Forest	Riparian	H-HHL	<0.1
WZD	Bottomland Hardwood Forest	Riparian	H-HHM	0.3
WZE	Bottomland Hardwood Forest	Riparian	H-MHH	1.3
WZF	Bottomland Hardwood Forest	Riparian	L-MLL	0.3
			Total	18.5

Table B6 - Jurisdictional Features of Open Waters in the Study Area

Map ID	NWI Classification	Area (ac.)
OWA	PUBHh	<0.1
OWB	PUBHh	0.5
OWC	PUBHh	0.2
OWD	PUBHh	1.2
OWE	PUBHh	0.8
OWF	PUBHh	0.4
Howell Reservoir	PUBHh	44.9
OWG	PUBHh	0.3
OWH	PUBHh	0.1
OWI	PUBHh	0.3
OWJ	PUBHh	<0.1
OWK	PUBHh	<0.1
	Total	48.7

# Appendix C – Typical Sections

PROJECT REFERENCE NO.	SHEET NO.
R-5706	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	



REVISIONS

8/17/99  
7/9/2018  
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